UNITED STATES

Armed Forces Medical Journal

VOL. 11 • NO. 5 • MAY 1960

Published Monthly
by the Armed Forces Medical Publication Agency
Department of Defense

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Monthly Message

The following paragraph is quoted from *Protracted Conflict*,[1] a challenging study of communist strategy. It needs no comment except to say that every one of us must take an active part in the efforts of the West to protect the freedom of man. In our modern era, these principles were first enunciated by the Althing in Iceland in the tenth century, and at Runnymede in the Magna Carta in 1215.

> The United States is the most nearly classless society of history. To be sure, groups and individuals still remain divided by economic and social barriers. Because so large an expanse of the American scene is bright, the shadows of poverty, disease, crime and intolerance are all the darker. Conversely, waste and crudeness mar the countenance which the affluent society turns to the peoples of backward countries so perilously close to the mere subsistence level. The very weight of material plenty now threatens to smother the flame of idealism that illuminates the first pages of American history. Paradoxically, the materialist philosophy of Communism evokes sacrificial zeal. Paradoxically, America's high-minded dedication to moral principle is blurred by much that is gross in practice. But, measured by the slow, grudging pace of more rigid societies in Europe and Asia, the forward thrust of American society has been sure and powerful. Each advance gives rise to new problems; inequities, taken for granted only yesterday, today agitate mightily the public conscience. The American dream has not yet come true, perhaps because it keeps on changing all the time. But its realization has become plausible, more plausible perhaps to peoples elsewhere than to some Americans obsessed with their country's shortcomings and impatient with its progress. It is this promise which America places on the scales of the systemic revolution.

Frank B. Berry

FRANK B. BERRY, M.D.
Assistant Secretary of Defense
(Health and Medical)

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1. Strausz-Hupé, R., Kintner, W. R., Dougherty, J. E. and Cottrell, A. J.: *Protracted Conflict*. (A Foreign Policy Research Institute book) Harper & Brothers, Publishers, New York, N.Y., 1959, p. 144.

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Foreword

The *United States Armed Forces Medical Journal* is a monthly publication of professional and administrative information for medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the United States Army, Navy, and Air Force invite members of the regular and reserve medical services, the professional consultants of the military departments, and other physicians and health scientists with an interest in Department of Defense activities to submit manuscripts for publication in this *Journal.*

FRANK B. BERRY, M.D.
Assistant Secretary of Defense

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UNITED STATES
Armed Forces Medical Journal

Historadiography of Hard and Soft Tissues

JOHN T. ISTOCK
CLARENCE W. MILLER
CAPTAIN FRANC W. CHAMBERS, JR., MSC, USN
COMMANDER HARVEY W. LYON, DC, USN

THE PRESENT STATUS OF MICRORADIOGRAPHY as a laboratory tool has resulted from the work of many investigators, among them Goby,[1] Lamarque [2] and Engström.[3] Earlier equipment consisted of a continuous evacuation type tube. The over-all apparatus was elaborate and expensive. Continuing work in this field, Combee, Houtman and Recourt [4] succeeded in developing a sealed-off x-ray tube having a thin beryllium window. A very low inherent filtration permitted the transmission of x-rays of long wavelength (1 to 5 kvp), which are required for the radiography of sections 5 microns or less in thickness.

The development of a "sealed-off" thin-window x-ray tube has permitted laboratories operating on limited budgets to perform microradiography of thin sections of hard and soft tissues, and has eliminated the requirement for expensive vacuum systems that were being used in the microradiography of extremely thin specimens. With thin-window tubes, microradiography of thin sections of plant or animal tissue can be accomplished with ease. Engström [5] has demonstrated on several occasions the wide and varied use of x-rays in the study of histopathologic sections. Hurley and Losee [6,7] have applied microradiography in the study of anorganic bone grafting, where mineral bonding between the host bone and the implant was of primary interest.

Procedures used in the preparation of paraffin sections for microradiography differ from those used for mineralized tissues. First, preparation of the film is required to prevent adhesion of the specimen to the emulsion. This report describes certain materials and methods used in the preparation of thin paraffin sections for contact micro-

From Naval Medical Research Institute, Bethesda, Maryland.

radiography. The microradiographic technic is a modification of that previously described by Istock, Miller, and Losee.[8]

MATERIALS AND METHODS

Soft tissues are prepared in a routine manner, including formalin fixation, alcohol-xylene dehydration, and final embedding in paraffin. Sections are cut on a Spencer rotary microtome 5 to 7 microns in thickness and allowed to float on 40° C distilled water. When ready for microradiography, the specimens are floated from the distilled water onto the emulsion surface of the slide.

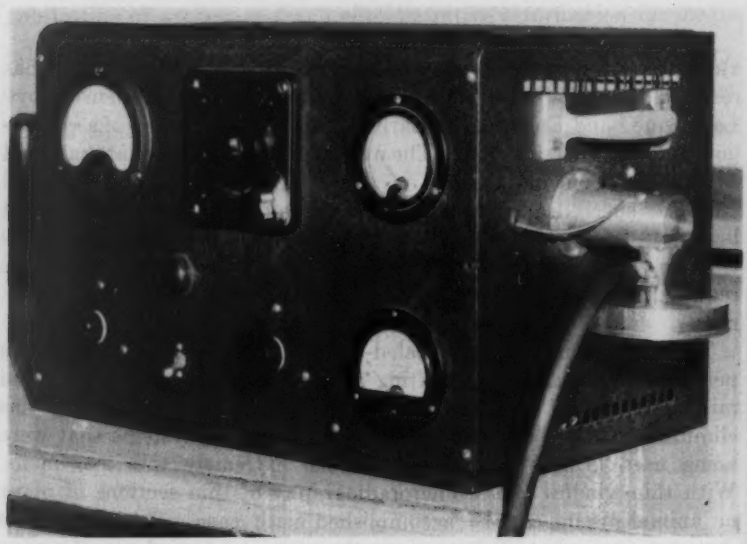

Figure 1. Compact, self-rectified x-ray generator with variable voltage range of from 1 to 5 kvp.

Specimens of bone are fixed in formalin, demineralized, and processed in graded alcohols (50, 70, 80, and 95 percent) for 2 hours in each solution. After alcohol equilibration, the bone is placed in terpinol for 24 hours. The process is completed by soaking in xylene for 2 hours followed by routine paraffin infiltration. Sections 5 to 7 microns thick are then floated on distilled water for transfer to the emulsion surface of the slide.

To produce fine detail by contact microradiography, an extremely fine-grain, high-resolution film is required, several of which are available commercially. The film selected for this work is Eastman Kodak spectroscopic plate 649–GH, having a resolution of over 1,000 lines per mm, available in various sizes. Since handling of these specimens for microradiography is similar to the mounting of specimens for standard histologic work, 1- by 3-inch spectroscopic plates were selected. This size is convenient for microscopic examination and subsequent storage of the final radiogram.

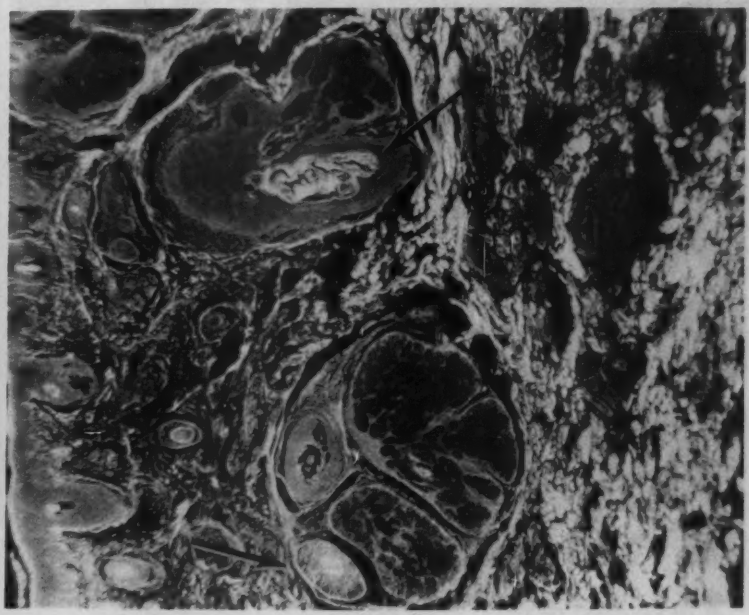

Figure 2. Microradiogram of skin from hand, 5 microns in thickness, demonstrating epidermoid carcinoma. Note the extreme radiodensity of the epithelial whorl (top arrow) and a shaft of hair (bottom arrow). The large sebaceous gland shows good morphologic detail. (x 40)

The film is first prepared to prevent the paraffin section from adhering to the emulsion. The plates are dipped twice in a 1 percent solution of Parlodion (shredded form of collodion) and dried for approximately 1 minute between dippings. After the second dipping in Parlodion, the plates are stored in a dust-free, light-tight container for at least 1 hour or until ready for use.

In a darkroom illuminated with a correct safelight (Wratten, series 6B), the paraffin section is floated onto the prepared film. The section is then blotted with damp bibulous paper to absorb moisture. The film with the adherent section is placed in xylene for 3 minutes to remove the paraffin, then rinsed in 95 percent alcohol. After the paraffin is removed and rinsing is complete, the section is ready for radiography.

Figure 3. High-power microradiogram of sebaceous gland shown in lower part of figure 2. Note preservation of acinar structure. (x 80)

After the radiographic exposure is completed, the film is placed in ether-alcohol (50–50 solution) for 5 minutes to dissolve the Parlodion and to remove the section from the emulsion. The emulsion is then placed in 95, 70, and 50 percent alcohols, respectively, for approximately 30 seconds in each solution. After removal from the alcohols the film is ready for development.

The spectroscopic plates are developed in undiluted Eastman Kodak D–19 developer for 7 minutes at 68° F, washed for 1 minute, then placed in a standard acid fix for 30 minutes. Development is

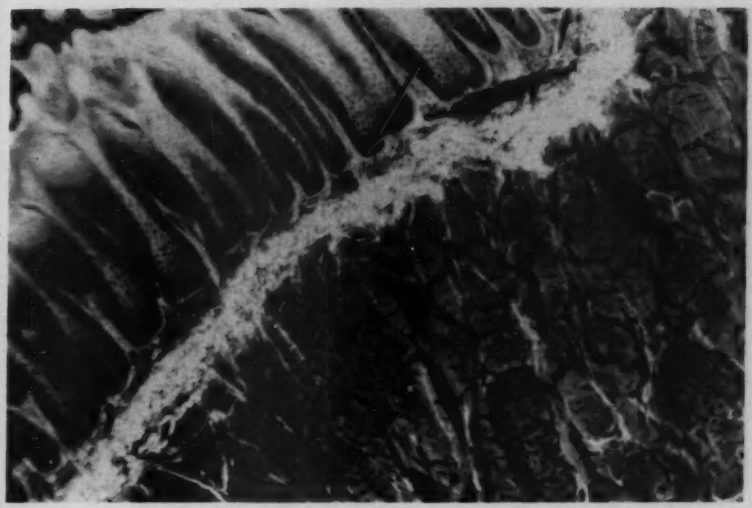

Figure 4. Microradiogram of section of rabbit tongue, 5 microns thick. Variations in radiodensity reveal 2 distinct zones in the lamina propria (arrow); the superficial portion appears to extend between the base of the papillae. This factor was not perceived with hematoxylin and eosin stain (see fig. 5).

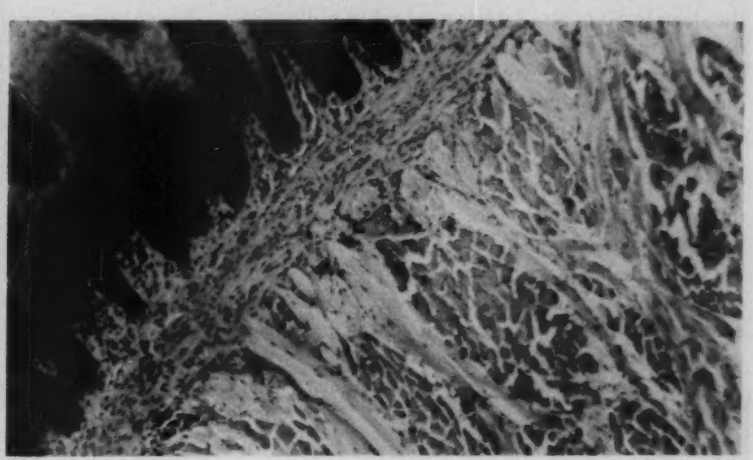

Figure 5. Photomicrograph of paraffin section of rabbit tongue, 5 microns thick (hematoxylin and eosin stain, x 80). Compare with the microradiogram in figure 4.

completed by washing in running water for 15 minutes, followed by drying in a dust-free atmosphere.

The x-ray generator (fig. 1) is of local design, made to operate with a Philips CMR beryllium tube at a voltage range of from 1 to 5 kvp and with current range of 1 to 3 ma. The exposure chamber was designed to be light tight with a set target film distance of 6 cm to accommodate a standard 1- by 3-inch spectroscopic plate. A vacuum pump is used to create a partial vacuum in the exposure chamber to eliminate air attenuation of the x-ray beam when using 1.5 kvp. For voltages above 2.5 kvp, the vacuum pump can be omitted.

When using sections 5 microns in thickness, exposure factors of 1.5 kvp, 1.5 ma, for 30 minutes produce satisfactory results. Thicker sections will require a higher voltage, and a slight increase in exposure time.

RESULTS AND DISCUSSION

The soft tissue microradiogram introduces a new tool for histologic examination of tissues. Further refinements in technic, such as the reduction of penumbra by increasing target distance, have produced microradiograms of high resolution. Note the interesting information obtained from figures 2 and 3. In figure 2 the superficial layer of epithelium, the keratinous whorl, the hair shaft in cross section, and the deep layer of the dermis are highly radiodense. Note the excellent detail in figure 3, where the magnification has been doubled.

In soft-tissue contact microradiography, reproduction of tissue morphology obviously depends upon differences in radiodensity of tissue components rather than upon tissue structure alone as perceived by photomicrographic reproduction of stained paraffin sections. The significance of this factor is demonstrated in figures 4 and 5. In figure 4, 2 distinct zones of radiodensity can be observed in the lamina propria. Note the extension of the more radiolucent areolar tissue between the base of the epithelial papillae. This is not apparent in the corresponding paraffin section (fig. 5) stained with hematoxylin and eosin and photographed with visible light. In figure 6, the microradiographic technic reveals extreme radiodensity of erythrocytes and the inner elastic membrane when compared with the tunica muscularis. In figure 7, the fibrous attachment of the periodontal membrane to the cementum of a tooth is revealed in new aspects. In figure 8, the microradiogram shows marked differences in radiolucency between the mucous acini on the right and the serous acini and tubules on the left. In figure 9, renal glomeruli exhibit greater radiodensity than the

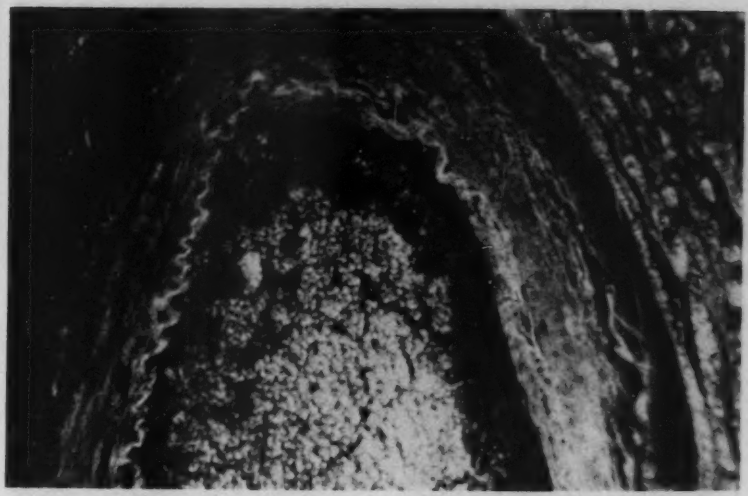

Figure 6. Microradiogram of a section of pancreatic intraglandular artery, 5 microns thick. Note the extreme radiodensity of erythrocytes and inner elastic membrane. (x 200)

Figure 7. Microradiogram of demineralized alveolar process of dog mandible, showing periodontal membrane between root cementum (top arrow) and lamina dura (bottom arrow). (x 80)

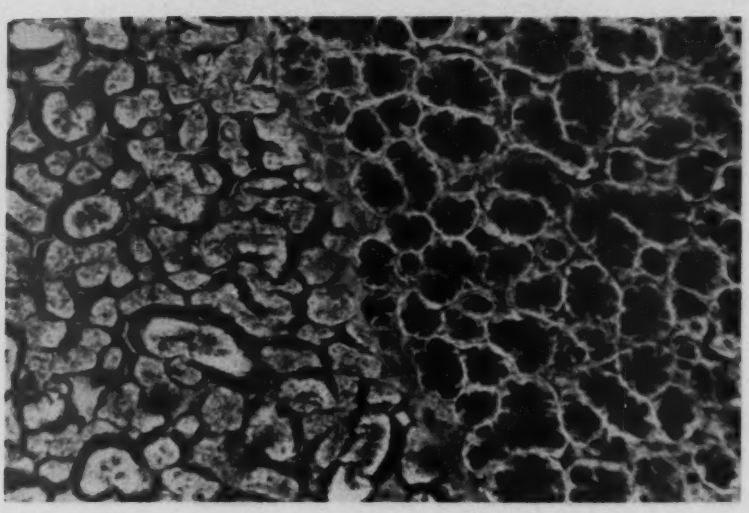

Figure 8. Microradiogram of rat submaxillary-sublingual salivary gland undergoing partial autolysis. Note that mucous acini on the right are free of autolytic changes and are highly radiolucent. (1.5 kvp, 20-minute exposure, 5 microns, x 80)

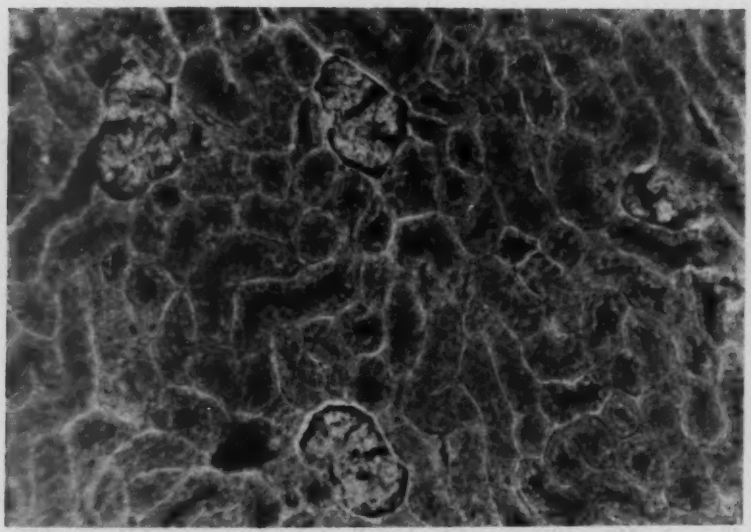

Figure 9. Microradiogram of rabbit kidney, showing glomeruli and collecting tubules. (1.75 kvp for 20 minutes, 5 microns, x 80)

adjacent tubules, probably because of the presence of erythrocytes.

Further value of microradiograms is exhibited in figure 10. In a recent nutritional study [9] many of the experimental animals died of urinary obstruction caused by renal calculi. Microradiograms of renal calculi entrapped in collapsed urinary bladder epithelium showed extreme radiolucency, indicating that at this stage the stones had not been mineralized. This was not realized when viewing paraffin sections stained with hematoxylin and eosin.

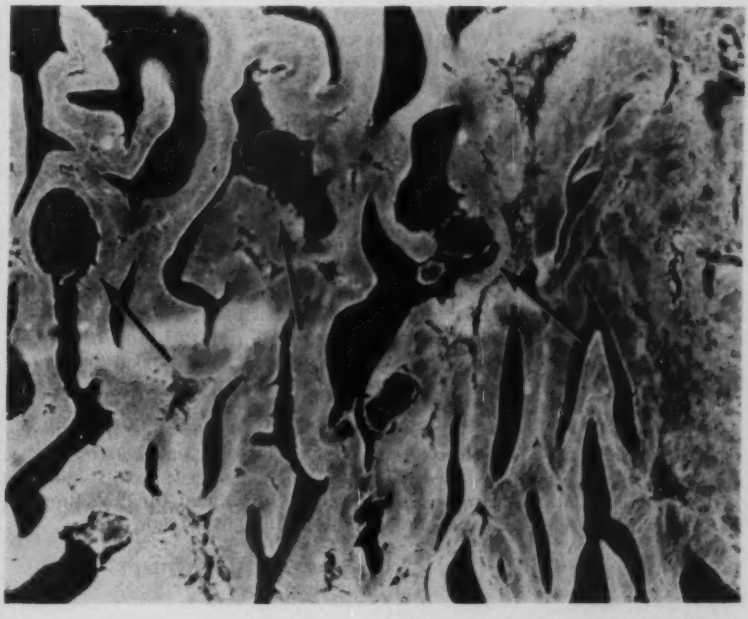

Figure 10. Microradiogram of renal calculi in rat bladder mucosa; this section was not demineralized. It is apparent from the lack of radiodensity that calculi (arrows) have not been calcified at this stage. (1.75 kvp for 20 minutes, 5 microns, x 80)

Further study is needed in order to determine whether fixation of tissues permits true radiographic representation. Shrinkage and hardening can produce artefacts. In future studies frozen sections will be examined.

SUMMARY

A simplified method for preparing and radiographing thin paraffin sections of hard and soft tissues for use in contact microradiography is described.

ACKNOWLEDGMENT: The authors wish to express their appreciation to Donald H. Manley, Hospital Corpsman, second class, USN, for his assistance in the preparation and radiography of the specimens used in this report. The x-ray generator used in this study was designed by Captain Franc W. Chambers and Hospital Corpsman, first class, Ralph E. Severance, USN.

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ALCOHOL AT THE WHEEL

Traffic accidents in European countries often are the results of the driver's consumption of alcoholic beverages. In France, 50 percent to 60 percent of the fatal accidents (or even 80 percent of them around Paris) are the fault of drivers who are under the influence of alcohol.—Claudius F. Mayer: Around the World. *Military Medicine*, November 1959.

Changes in Visual Standards and Their Expected Effect on Manpower Procurement

BERNARD D. KARPINOS, PH.D.

VISUAL STANDARDS have been changed more frequently than any other physical standards governing the acceptability of men for military service. These changes have always been oriented toward a more realistic approach to the problem of visual requirements within military establishments that are becoming functionally more and more diversified. Practically nothing, however, is known about the extent to which manpower procurement has been, or is likely to be, affected by these changes.

Changes in visual standards involve, first, a purely quantitative question, namely, how many more, or fewer, persons may be expected to qualify for military service under the various modifications. Second, there is a question of "absorption": since a person's limited vision may impose certain limitations in his military job assignment, the problem of finding proper assignments for such persons arises.

The objective of this article is to provide current statistical data that should serve as a basis for evaluating the effect of various visual standards on manpower procurement.

POPULATION STUDIED AND DATA USED

The Surgeon General's Office, Department of the Army, receives from the Armed Forces examining stations (AFES) a copy of Standard Form 88 (Report of Medical Examination) for each registrant who is disqualified by these stations for military service, and for each qualified registrant who is inducted into the Army. For this investigation, the medical reports (Standard Form 88) of the registrants who were processed for military service during the 21-month period from January 1957 through September 1958 were chosen. These

From Medical Statistics Division, Office of The Surgeon General, Department of Army, Washington, D.C.

were the latest available reports at the time the study was undertaken.

During the period, 50 percent of these reports were coded. This sample was selected by taking all reports of the disqualified registrants whose selective service numbers assigned to them by their local boards ended in an odd digit, and all reports of the inducted registrants whose Armed Forces service numbers ended in an odd digit. The coded data used here pertain to distant vision, determined as prescribed by Army regulations on physical standards for induction and enlistment in regard to testing visual acuity.[1]

Both the examinee's uncorrected and corrected (or correctable) distant vision, for each eye separately, are recorded on his medical examination report (Standard Form 88, item 59). The visual readings are expressed in Snellen notations.

The sample comprised some 276,000 reports of medical examinations. Because no visual data were available for 1.3 percent of the examinees in the sample, the final sample population used in this analysis included some 272,000 examinees. The majority of these examinees (58.1 percent) fell within the 22- to 23-year age range. Their mean age was computed as 21.8 years (table 1).

Table 1. ***Age distribution of registrants examined for military service, January 1957 through September 1958***

Age group (years)	*Percent distribution*
Total	100.0
Under 20	15.6
20–21	23.3
22–23	58.1
24–25	2.8
26 & over	0.2
Mean age: 21.8 years	

Tabulated Data

The examinees included in the sample were distributed by race and military qualification as follows: white, 109,000 disqualified and 112,000 inducted; Negro, 37,000 disqualified and 14,000 inducted.

The coded data were put on punch cards, from which the following cross tabulations with respect to vision were prepared for each of the 4

above-mentioned groups (white disqualified; white inducted; Negro disqualified; Negro inducted):

1. Uncorrected vision of right eye by uncorrected vision of left eye.
2. Uncorrected vision of right eye by corrected (or correctable) vision in the same eye.
3. Uncorrected vision in left eye by corrected (or correctable) vision in the same eye.

These cross tabulations indicated certain differences in the distributions by visual acuity of disqualified versus those of inducted registrants (within each race)—the inducted registrants having better vision; and of white versus those of Negro registrants—the latter group having better vision. Because of these differences in the distributions and because of disproportionality in the ratios of qualified (inducted) to disqualified registrants in our study, corresponding distributions that would include all registrants, irrespective of military qualification and race, could not be obtained properly by straight addition of the separate cross tabulations. Such a procedure would have given undue weight to the distributions of disqualified registrants and hence would somewhat bias the over-all distributions. The cross tabulations were, therefore, adjusted to preclude such a bias, as explained in the following section.

Adjustment of Data

From the monthly reports (Summary of Registrant Examinations for Induction, DA Form 316) submitted by the Armed Forces examining stations to the office of the surgeon general of the Army, the following ratios of qualified to disqualified registrants (excluding administrative disqualifications) were established for this period, January 1957 through September 1958:

White—2.031 qualified: 1.000 disqualified
Negro—0.555 qualified: 1.000 disqualified

The cross tabulations relating to inducted registrants were taken as representative of all qualified registrants, but their ratio* to dis-

*These differences in the ratios stem from the fact that the medical reports of qualified registrants are received only for those who are inducted, as previously indicated. A certain number of those who qualify enlist prior to induction. Others may not be called up at all and their medical reports are not available. In taking the cross tabulations of those inducted as representative of all qualified registrants, as stated in the text, the assumption was made that the distributions by visual acuity of the latter 2 qualified groups are essentially the same as of those who were qualified and inducted. There seems to be no reason to doubt the validity of such an assumption. Obviously these differences are not due to sampling.

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qualified are obviously different from those derived from the monthly reports. Consequently, for proper evaluation the separate tabulations were "weighted" to agree with the latter ratios. Actually, the weighting resulted in multiplying the cross tabulations of the white inducted registrants by 1.99, and those of the Negro inducted registrants by 1.42, cell by cell, and then combining these adjusted cross tabulations with the corresponding cross tabulations of the disqualified examinees, by race. No adjustment was necessary in combining the white and Negro distributions.

DERIVATION OF BASIC TABLES

Two basic tables (tables 2 and 3) were derived from these combined (weighted) tabulations for analyzing the expected effect of changing visual standards on manpower procurement.

Distribution by Uncorrected Vision

The first basic table (table 2) was derived from the combined (weighted) cross tabulations of uncorrected vision of the right eye by that of the left eye. Since the visual standards are expressed in terms of acuity, whether of the right or the left eye, this table presents the distribution of the examinees by distant vision in terms of vision in the better and worse eyes, rather than in the right by left eye. The distributions were computed to a base of 100,000.

Table 2 is to be read as follows: The top figure of the first column

Table 2.—*Distribution of registrants examined for military service by uncorrected distant vision in the better and in the worse eyes, January 1957 through September 1958*

		Better eye										
Worse eye	Snellen notation	20/20	20/30	20/40	20/50	20/70	20/100	20/200	20/400	<20/400	Blind	Total
	20/20	71,238	—	—	—	—	—	—	—	—	—	71,238
	20/30	4,758	4,239	—	—	—	—	—	—	—	—	8,997
	20/40	766	1,134	900	—	—	—	—	—	—	—	2,800
	20/50	423	421	470	531	—	—	—	—	—	—	1,845
	20/70	555	415	432	426	927	—	—	—	—	—	2,755
	20/100	315	209	173	172	516	921	—	—	—	—	2,301
	20/200	492	228	136	141	326	617	2,043	—	—	—	3,983
	20/400	590	165	81	48	108	148	607	1,714	—	—	3,461
	<20/400	236	67	34	23	46	55	203	1,176	505	—	2,345
	Blind	193	27	8	4	9	6	13	8	7	—	275
	Total	79,566	6,900	2,234	1,345	1,932	1,747	2,866	2,898	512	—	100,000

indicates that out of 100,000 registrants currently examined for military service one may expect 71,238 examinees to have 20/20 bilateral vision (20/20 in both the better and the worse eyes); 4,758 examinees, 20/20 vision in the better eye and 20/30 in the worse eye; 766 examinees, 20/20 vision in the better eye and 20/40 in the worse eye, et cetera. The total of this column (bottom of column) indicates that one may expect 79,566 out of the 100,000 examinees to have 20/20 vision in the better eye, the other eye being as good or worse. Similarly, the column labeled 20/30 indicates that out of 100,000 examinees, one may expect 4,239 examinees to have 20/30 bilateral vision; 1,134 examinees, 20/30 vision in the better eye and 20/40 in the worse eye; 421 examinees, 20/30 in the better eye and 20/50 in the worse eye, et cetera. The total of this column indicates that out of 100,000 examinees one may expect 6,900 examinees to have 20/30 vision in the better eye, the other eye being as good or worse. The same interpretation applies to the other columns of the table.

Vision less than 20/400 (<20/400) includes light preception; blind includes missing eye(s). No persons blind in both eyes are indicated by this table, since such persons are ordinarily screened out by the local boards prior to being forwarded to the Armed Forces examining stations.

Probabilities of Correctability

Since corrected vision is a determining factor in the visual standards, the second basic table (table 3) was prepared to show the probability of correcting a given uncorrected distant vision to a given, but not better, corrected distant vision.

From the weighted cross tabulations of uncorrected vision versus correctable vision, probabilities of correctability were initially computed for the right eye and the left eye, separately. A statistical evaluation of these separate probabilities indicated no significant differences between them. Consequently, the probabilities presented in table 3 were computed by combining the weighted cross tabulations of uncorrected versus correctable vision of the right eye with those of the left eye.

The probabilities given in table 3 are to be interpreted in the following manner: For instance, the column labeled 20/100 uncorrected vision indicates that its probability of being corrected as high as 20/20 vision is 0.588; to not better than 20/30, 0.217; to not better than 20/40, 0.095; et cetera. In other words, one may expect that 58.8 percent of the persons having 20/100 uncorrected vision are likely to have their vision corrected to as high as 20/20; 21.7 percent, to not better than

20/30; and 9.5 percent, to not better than 20/40. Altogether, 90.0 percent of the persons with 20/100 uncorrected vision can expect to have their vision corrected to 20/40 or better. The remainder (10.0 percent) cannot expect to have their 20/100 vision corrected to as high as 20/40. The other columns of table 3 are to be interpreted in the same manner.

Table 3. ***Probabilities of correctability of a given uncorrected distant vision to a given corrected distant vision, but not better, January 1957 through September 1958***

		Uncorrected distant vision						
Best corrected distant vision	Snellen notation	20/40	20/50	20/70	20/100	20/200	20/400	<20/400
	20/20	0.681	0.577	0.603	0.588	0.603	0.571	0.309
	20/30	0.274	0.303	0.237	0.217	0.198	0.232	0.217
	20/40	0.045	0.082	0.090	0.095	0.074	0.067	0.090
	20/50	—	0.038	0.033	0.030	0.025	0.021	0.037
	20/70		—	0.037	0.041	0.032	0.027	0.036
	20/100			—	0.029	0.030	0.018	0.022
	20/200				—	0.038	0.027	0.027
	20/400					—	0.037	0.025
	<20/400						—	0.237
	Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000

USE OF BASIC TABLES

Both basic tables (tables 2 and 3) are necessary for evaluative purposes, whenever the visual standards are expressed in terms of uncorrected and corrected vision. The manner in which these tables can be used for this purpose is illustrated by the following 2 examples.

Suppose that the standards for acceptability of distant vision have been established as: (a) minimum of 20/40 corrected vision in the better eye, in some instances; and (b) minimum of 20/70 corrected vision in the better eye, in other instances. The question is: On the basis of present experience, how many of the examinees can be expected to qualify under these standards? The computations are illustrated in detail in table 4.

Under the standards of acceptability of a minimum of 20/40 in the better eye, the 88,700 registrants (table 2) with uncorrected distant vision of 20/40 or better in the better eye would obviously qualify. (This number includes all registrants in table 2 with 20/20, 20/30, and 20/40 vision in the better eye.)

For persons with less than 20/40 uncorrected vision, their correctability to 20/40 is to be considered. As indicated in table 3, of those who have 20/50 uncorrected vision, the cumulative probability of being corrected to 20/40 or better is 0.962. (This figure is obtained by summing the probabilities of 20/20, 20/30, and 20/40 corrected vision for the 20/50 column, table 3.) Since the number is this group is 1,345 (table 2), one may expect that 1,294 persons ($=1{,}345\times0.962$, table 4a) from this group could have their vision corrected to 20/40 or better. For those with 20/70 uncorrected vision, the cumulative probability of having their vision corrected to 20/40 or more is 0.930 (table 3). Since their number is 1,932 (table 2), the number of persons who could be expected to qualify from this group under this standard is 1.797 ($=1{,}932\times0.930$; table 4a). The same procedure is followed in the other computations for a minimum of 20/40.

Table 4. ***Number of examinees expected to qualify under the following standards of distant vision: (a) 20/40 corrected vision in the better eye; (b) 20/70 corrected vision in the better eye***

Standards of acceptability in the better eye			
(a) 20/40 corrected vision		*(b) 20/70 corrected vision*	
Uncorrected vision	*Number expected to qualify (per 100,000)*	*Uncorrected vision*	*Number expected to qualify (per 100,000)*
20/40 or better	88,700	–	–
20/50 correctable to 20/40	1,294	–	–
20/70 correctable to 20/40	1,797	20/70 or better	91,977
20/100 correctable to 20/40	1,572	20/100 correctable to 20/70	1,606
20/200 correctable to 20/40	2,508	20/200 correctable to 20/70	2,671
20/400 correctable to 20/40	2,521	20/400 correctable to 20/70	2,660
<20/400 correctable to 20/40	315	<20/400 correctable to 20/70	353
Total	98,707		99,357

As shown in table 4a, 98.7 percent of the examinees may be currently expected to qualify under a minimum of acceptability of 20/40 corrected vision in the better eye.

Similar computational procedures apply to the standards of acceptability of a minimum of 20/70 in the better eye. Under these

standards, all registrants (91,977) with 20/70 or better uncorrected distant vision in the better eye would qualify. (This figure includes all registrants with 20/20, 20/30, 20/40, 20/50, and 20/70 distant vision in the better eye; table 2). Evidently, the probabilities of correctability to 20/70 (table 3) are to be applied to persons with less than 20/70 distant vision in the better eye, namely, to those with 20/100 or less. Thus, of the persons with 20/100 uncorrected distant vision in the better eye (1,747; table 2), 1,696 persons may be expected to have their vision corrected to 20/70 (table 4b). (Their cumulative probability to be corrected to 20/70 is 0.971; 1,696= 1,747×.971). All computations with respect to these standards are shown under *b*, table 4. As indicated by the results of these computations, 99.4 percent of the present-day examinees may be expected to qualify under visual standards of a minimum of 20/70 corrected vision in the better eye.

By lowering the visual standards from 20/40 in the better eye to 20/70 in the better eye, an increase of 650 persons (99,357 minus 98,707; table 4) per 100,000 examinees may be expected. But only from 65 to 70 percent of these would actually qualify, since on the basis of past and present experience from 30 to 35 percent of them may be expected to be found unacceptable because of mental, or medical (other than visual) reasons. Hence, the net gain would be between 400 and 450 individuals per 100,000 examinees.

By similar computations one may utilize the data in tables 2 and 3 for any desired visual standards.

Although limited to registrants examined (exclusive of enlistments, ROTC, various reserves, et cetera), it seems that these data may be quite reliably taken as indicative of what may generally be expected in the total manpower pool within the presented age range. The present experience presents, of course, a young group. Both the distribution by visual acuity and the probabilities of correctability become less favorable with increasing age.

SUMMARY

Although physical standards with respect to vision have undergone more frequent changes than other physical standards, practically nothing is known of the extent to which these various changes have affected, or are likely to affect, manpower procurement. To provide a basis for such evaluation, a study of the visual acuity of registrants examined during the 21-month period from January 1957 through September 1958 was undertaken. This study, accomplished on a

sample basis, included some 272,000 registrants who were either disqualified or inducted during this period. Most of these registrants were within the 22- to 23-year age range, and their mean age was 21.8 years.

Two basic tables (tables 2 and 3) were derived from the visual data abstracted from the reports of the medical examination of these examinees, showing: (a) distribution of the examinees by distant vision in the better and the worse eyes (table 2); and (b) probabilities of correctability of vision (table 3). Two examples demonstrate how these basic tables can be used for evaluating the effect of various changes in the visual standards on manpower procurement.

REFERENCE

1. Army Regulations 40–503: Physical Standards and Physical Profiling for Enlistment and Induction, 9 May 1956. Section V, Eyes; par. 19, Vision.

THE "RUNNING START"

Recently, while reading an issue of a widely circulated medical journal, I observed frequent instances of what has come to be my pet abomination. I call it the "running start." Here are a few examples:

"It is generally agreed that . . ." *By whom?*
"In spite of the fact that . . ." *Why not "although"?*
"It is probable that . . ." *Why not "probably"?*
"I would like to say that . . ." *Who is stopping him?*
"I shall discuss . . ." *Why threaten?*
"It is my intention to present . . ." *So go ahead!*
"It should be pointed out . . ." *So point out!*
"There would seem to be . . ." *So, scientifically, is there?*

All these were in one issue. Psychologically the "running start" is an indication of doubt by the writer or speaker of what he is going to say or whether or not it is really worth saying. We may as well accept his own evaluation.—Morris Fishbein: The "Running Start" in Medical Writing (editorial). *Postgraduate Medicine*, October 1958.

Hospital Outpatient Service and Sound Planning

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THE USE OF hospital outpatient services in this country, especially since World War II, has markedly increased. In 1948 there were 43,431,338 outpatient visits [1] and by 1957 the number had increased to 86,754,981.[2] The hospital outpatient department was originally designed to provide care for the indigent patient. It has now become an essential public health service to the community. Here many of the elaborate diagnostic and therapeutic tools of modern medicine are available to the physician and his patient. It is truly a diagnostic center necessary to all modern hospitals if they are to meet their responsibilities in the community.[3]

Many factors are responsible for this trend in medical care. Advances in medicine, such as the use of antibiotics to combat infections, early ambulation, emphasis on the prevention or early diagnosis of diseases, and many new technics have made it possible to treat as outpatients many patients who previously required hospitalization. In addition, many patients requiring hospitalization are being discharged earlier and are completing their treatment as outpatients. Ginzberg[4] has called attention to the economic and medical advantages of outpatient care.

The trend toward more outpatient care is not confined to civilian medical practice. The military services have emphasized care of the ambulatory patient for many years. In 1957 there was a daily average of 37,266 outpatient visits to Army medical treatment facilities, 40 percent of which were made by dependents of military personnel.[5] The increase in Army outpatient care has reduced the over-all cost of providing adequate medical care. There has been a reduction in the number of occupied beds and in time lost from duty by military personnel; the number of medical personnel necessary to provide adequate care has also been reduced.[6]

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In spite of the obvious medical and economic advantages in outpatient care and the increasing demands for such service, civilian and military hospitals are not providing the quality of service that could logically be expected. This is one of the major problems facing the field of hospital administration today. Too many outpatient departments are not receiving the attention they deserve; they are still the stepchildren of the hospital family.

Some of the more important deficiencies in the operation of outpatient departments of military hospitals were highlighted in the replies to a recent questionnaire sent to a number of dependents of Army, Navy, and Air Force personnel. Many complained of "the lack of continuity of doctor-patient relationship, long waits, impersonal handling of cases, and crowded conditions."[7] These findings are of deep concern to the surgeon general of the United States Army. He has appointed a special committee to seek solutions to the outpatient care problem. Outpatient care is also a subject for discussion at most conferences and institutes sponsored by his office.[7]

PLANNING FOR OUTPATIENT CARE

In Army hospitals it has been traditional to consider the inpatient more important than the outpatient. Most of our efforts have been directed toward the improvement of inpatient care, with too little attention given to the forgotten outpatient. This point is well illustrated by a study of the organization charts of Class I and II Army hospitals. Where is the Outpatient service in the charts? In the Class II hospital there are departments of surgery, medicine, and neuropsychiatry, while one level lower in the chart is the outpatient service, along with such ancillary services as pharmacy and laboratory.[8] In the Class I hospital all professional care elements are classified as services, but here again the outpatient service is one level below medicine, surgery, and neuropsychiatry.[9]

Organizational Changes

The outpatient service plays a key role in the prevention, early diagnosis, and treatment of illnesses and in the reduction of inpatient workloads. It has assumed a position of great importance in the total Army medical care program and must be given a status commensurate with that position. It must be elevated to the same level in the organization charts of Army hospitals as is now occupied by medicine, surgery, and neuropsychiatry—a position it rightly deserves.

There should be little question as to the value of increased status for the outpatient service. It would result in more attention for the service from the hospital commander and the professional and administrative staffs. Of even more importance, it would help to remove the stigma now attached to the position of Chief, Outpatient Service. Most medical officers have a tendency to look down on this position and do their best to avoid such an assignment. Increased status would require the assignment of a professionally qualified senior medical officer as chief of the outpatient service, a change that has been needed in many Army hospitals for a long time.

A stigma is attached even to the word "outpatient," probably because of its long association with indigent care.[10] To remove this stigma and to elevate the status of outpatient facilities in Army hospitals, a change in name is warranted. One possibility is the phrase "clinic patient." The outpatient service would be redesignated Department of Clinics in Class II hospitals and Clinic Services in Class I hospitals. The general outpatient clinic would become the general medical clinic; specialty clinics would retain their present designations. These proposed new names will be used in the remainder of this article.

Changes in Operating Concepts

There is a definite need for a closer integration of the whole clinic structure in Army hospitals. Under the present concept of operation, there is no over-all co-ordination. Each specialty has its own clinic, over which it has complete control. There is a tendency in many hospitals for these clinics to become small empires. They diagnose and treat conditions in a limited area of the body or a specific class of diseases and show very little interest in the patient as a whole, or in the co-ordination of medical care that is so essential to adequate patient care.[11]

Not all the blame can be placed upon the specialty clinics. The very character of many general medical clinics contributes directly to the problem. Because of limited time, lack of professional ability, or lack of interest on the part of some physicians, patients are frequently given a cursory examination and then referred to a number of specialty clinics for consultation or treatment. Often the patient may never see the same physicians in the general medical clinic again. This method of operation too often results in piecemeal care of the patient and violates the concept of comprehensive care that is receiving so much attention today.[12] It is expensive for the patient, the physician, and the hospital. It causes duplication of visits and un-

necessary laboratory studies and roentgenograms, and because of it the patient may receive conflicting instructions from physicians.[11]

There is no panacea for this problem but it can be greatly minimized by placing all hospital clinics under the administrative control of the chief of the department of clinics. This change would result in more uniform clinic operations and better integration and coordination. Each specialty would still be responsible for the staffing and professional supervision of its specialty clinic.

Not only must there be closer integration of the clinics, but there must also be a closer integration of clinic and inpatient care.[13] Continuity of care is hardly possible when patient A sees physician B in the general medical clinic, is referred to a specialty clinic where she sees physician C, is admitted to the hospital where she is treated by physician D, and upon discharge from the hospital is followed in the clinic by physician E. It is little wonder that patients complain about the cold impersonal manner in which they are handled and the lack of continuity in the doctor-patient relationship. It is frustrating to the patient and the conscientious physician.[14] I believe that this is one of the main reasons that medical officers "regard outpatient and dispensary work as distasteful and fit only for junior officers who have no recourse." [15] As a result of this attitude, the most junior and least experienced officers are usually found in the clinics, whereas the senior and more experienced officers are devoting their time to inpatient care. This method of clinic staffing is not reasonable. Some of the most challenging diagnostic and therapeutic problems are found among clinic patients. Without the advice and services of able and mature physicians, the quality of clinic care will suffer.[16]

A system must be established to assure maximum continuity of doctor-patient relationship. "The patient should have the same physician when he is horizontal as when he is vertical." [11] It is realized that this may not always be possible, but the present system can certainly be improved. It will mean a break with traditional procedures, but it will improve the quality of patient care, which is the goal.

To assure continuity of patient care, all physicians must have both ward and clinic responsibilities. This requires the elimination of the full-time staff of physicians in the general medical clinic. These physicians, except for the chief of the department of clinics, would be reassigned to the department of medicine. The chief of the department of medicine would then be responsible for staffing the general medical clinic with physicians. The chief of the department of clinics, in addition to his administrative duties, would be responsible for professional supervision and consultation in the general medical clinic.

With this plan, all physicians would be assigned specific periods each week to work in a given clinic according to schedules prepared by their respective chiefs, in co-ordination with the chief, department of clinics. Clinic duties would be in addition to ward duties and would be of equal importance. To facilitate scheduling of appointments with specific physicians, clinic work schedules would have to be prepared well in advance. Once prepared, these schedules would not be changed except for compelling reasons.

With this concept of patient care, Mrs. Jones is seen by physician B in the clinic, is admitted to the hospital where her doctor is physician B, and is discharged to be followed in the clinic by physician B. This is the kind of doctor-patient relationship we must have; it is rewarding to both the physician and patient. The physician gains satisfaction from the opportunity to provide total care for the patient and will have much more incentive to work in the clinic. The patient will feel that she is being treated as a person instead of as another case. This procedure cannot help but result in an improved quality of patient care.

For the system to work effectively and efficiently, the practice of having a ward officer responsible for all patients on a given ward would have to be discontinued. Medical officers on a given service might have patients on any ward of that service. This system has been used in civilian hospitals for many years.

The participation of all physicians in clinic work should be especially valuable in the Army teaching hospitals. There is a wealth of teaching material among clinic patients for these patients are frequently more of a diagnostic challenge than are inpatients. Residents and interns are not receiving the well-rounded training they need when all teaching is with the inpatient. If the teaching is to be effective, however, the mature and experienced members of the staff must take an active part in it.[17]

Appointment System

A well-organized and workable appointment system will do much to reduce the overcrowding and long waiting periods encountered in many Army hospital clinics. "One of the most annoying experiences to the patient and a detriment to good public relations is the seemingly interminable waiting for and between appointments." [1] There seems to be a prevailing assumption that the patient's time is of little consequence and all emphasis is placed on saving the physician's time. The goal must be to save the patient's time and not to waste the time of the physician.[18]

The majority of Army hospitals have a separately administered appointment system for each clinic with little or no co-ordination between the clinics. This may require patients to make two visits to the hospital when only one visit would be necessary. A centralized appointment system, operated by one or more appointment clerks, under the supervision of the chief of the department of clinics and his administrative staff, would be much more efficient. Appointment clerks must be carefully selected and thoroughly oriented in their duties. They must have sound judgment, know how to get along with people, and have enough common sense to seek medical advice on appointments that appear to be urgent. The concept of clinic operation proposed here would facilitate the operation of a centralized system. Clinic work schedules of physicians would be available and appointments could be made with specific physicians.

One of the key factors in an effective appointment system is punctuality on the part of the patient and the physician. Generally speaking, it is the physician who is late and not the patient. It has almost become a tradition with physicians to be late for clinic hours. They must be made to realize that their lack of punctuality either results in hurried examinations or increases the waiting time of patients. Both of these are undesirable and must be avoided.[19]

Another cause of excessive waiting periods is the tendency to schedule more patients for a physician than he can see. This is inherent in a system that sets arbitrary time periods for all clinic physicians to see new and old patients. The time required for patients varies with each physician; some physicians are fast, others are slow. Realistic consultation times must be determined for individual physicians and used as a basis for scheduling appointments.

Every appointment system must allow for emergency patients and other "drop-ins" of an urgent nature. The practice of some hospitals to refer all these patients to the emergency room is not completely satisfactory. This generally reduces the crowded conditions in the clinic, but increases them in and around the emergency room. A better solution is to leave some open time on each physician's appointment schedule to care for these cases or, if the number warrants, to assign each clinic physician a day of the week on which he will care for "drop-ins." Such a system is much more desirable than sandwiching these patients in between appointments, a practice that will only result in increased waiting time for those patients with appointments.

Although these proposals will not eliminate waiting times or overcrowding in all Army hospital clinics, they will minimize them. They will not solve the problem of the appointment backlog that exists in

most clinics. Some hospital clinics are 2 to 4 weeks behind in appointments, a situation directly attributable to the lack of physicians to care for the great number of individuals whose medical care is authorized. The number of physicians authorized to the military services by the Department of Defense is based on the strength of military personnel and does not take into account the large number of dependents and retired personnel who must be provided with medical care. This is unrealistic and warrants reconsideration.[20]

Physical Facilities

The clinic facilities in most Army hospitals are entirely too small for the number of patients to be served. This is true not only in the older hospitals but also in newly constructed ones. Military hospital construction planning has not kept pace with the increasing demands for ambulatory patient care.[20] In addition to being too small, many of the clinics lack physical integration. They are often scattered throughout the hospital, far removed from x-ray, pharmacy, laboratory, and other required ancillary services. This will not facilitate efficient operation.

Ideally, all clinics should be in one location and easily accessible to the patient. They should be in close proximity to laboratory, x-ray, pharmacy, and other auxiliary facilities. Traffic of patients within the hospital should be kept to a minimum. To meet these requirements, most hospital designers are placing clinics on the ground floor of hospitals, with a separate outside entrance for patients.[1]

Efforts must be made by each Army hospital commander to improve the clinic facilities in his hospital. He must be constantly on the alert for ways and means to enlarge clinic facilities and to integrate them more closely. It may be that some inpatient areas are no longer needed for that purpose and could be converted to better clinic facilities. Clinic waiting rooms should receive special attention. Many should be redecorated and refurnished to make them more attractive and comfortable, and to help lessen the annoyance of waiting.[21]

Interpersonal Relations

Patients frequently complain about the cold impersonal way they are handled in clinics. Some clinic personnel do not understand the patient's attitudes and feelings. Although especially true among most nonprofessional personnel this is also true of some doctors and nurses.

People who are ill or who think they are ill do not react to situations as they would if they were well. They are apprehensive, emotional, and easily upset. Their reactions may range from an unexplained overt action to a well-concealed stress and are based on emotions rather than logic. If conflicts are to be avoided, clinic personnel must have a better understanding of patient behavior and know how to apply this knowledge. They must handle patients with sympathy and understanding and treat them as individuals rather than cases.

A minimum of 4 hours of instruction on interpersonal relations in the care and management of patients, repeated as often as necessary, has been specified by the Department of the Army for all nonprofessional personnel in Army medical treatment facilities.[22] It is incumbent on all hospital commanders to give this program their full support and guidance. Special attention must be given to the training of receptionists and appointment clerks. They usually have the first contact with the patient and have an excellent opportunity to establish a friendly relationship with him.

Mechanization of Clinic Records

The number of medical records for dependents and retired military personnel in Army hospital clinics is increasing constantly. In most clinics, the permanent identifying information required on records is either typed or handwritten by clinic personnel—a time-consuming practice that may also result in illegible and possibly inaccurate information. Much of the difficulty with misfiled and unidentifiable records stems from this practice.

In a test conducted at three Army medical treatment facilities, it was found that a mechanical imprinting method, which records the permanent identifying information on the clinic records, had many advantages over the manual method. It was cheaper, six times faster, and assured accuracy and legibility. It also facilitated the filing and finding of records and reduced the chances for misfiling.

This method is based on the use of a flexible, laminated patients' recording card. When a new patient registers for the clinic, a clerk embosses the proper identifying information on the card with a special typing machine. The Uniformed Services Identification and Privilege Card (DD Form 1173) or the Identification Card (DD Form 2A) is used as the source of information. The clerk then places the card in an imprinter and imprints all of the necessary initial records and the file folder. The card is retained permanently by the patient and is presented to the clinic on subsequent visits for further use in imprinting requests for laboratory tests and roentgenograms, prescriptions, and other forms.

The mechanical method of keeping clinic records has been approved by the surgeon general and has already been adopted by several Army hospital clinics. It would be of great value to all Army hospital clinics.

SUMMARY AND CONCLUSIONS

Most Army hospitals are not providing outpatients the quality of service they rightfully deserve. Such deficiencies as lack of continuity of doctor-patient relationship, long waiting periods, impersonal handling of cases, and crowding are much too common. The quality of service rendered to outpatients in Army hospitals would be greatly improved if the following measures were implemented: (1) The outpatient service should have a position in the organizational chart equal to that now occupied by surgery, medicine, and neuropsychiatry. (2) The name "outpatient" should be changed to "clinic patient." (3) The outpatient service should be redesignated Department of Clinics in Class II hospitals and Clinic Services in Class I hospitals. (4) All clinics in the hospital should be under the administrative control of the chief of the department of clinics. (5) All physicians in the hospital should have both ward and clinic duties. (6) The practice of assigning a ward officer to each ward should be discontinued. (7) A well-organized and workable appointment system should be initiated. (8) The physical facilities of clinics should be large enough to accommodate comfortably the number of patients to be served. Waiting rooms of most clinics should be enlarged and redecorated. (9) All clinics should be located in one area of the hospital in close proximity to the x-ray, laboratory, and other required ancillary services. (10) All clinic personnel should receive training, repeated as often as necessary, in interpersonal relations. (11) The mechanical imprinting method of clinic records should be installed.

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TOO MANY OR TOO FEW

In Britain and other of the more favored countries there are too many sanatorium beds: in India and many other countries there are too few. India is estimated to have 2½ million people with active tuberculosis requiring treatment but only 23,000 tuberculosis beds for them—100 patients per bed.—Mass Treatment of Tuberculosis. *The Lancet*, November 21, 1959.

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Personnel Monitoring With Large Liquid Scintillation Counters

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LARGE LIQUID SCINTILLATION COUNTERS offer a unique combination of high sensitivity and moderate energy resolution and hence are particularly useful for the rapid measurement of body radioactivity. It is necessary that this radioactivity involve the emission of gamma rays or hard beta rays (and hence bremsstrahlung). In this category are not only a large number of common radioactive contaminants but also body radioactivity induced by neutron exposure (mainly Na^{24}).

When the identity of the radionuclide is known, the large liquid scintillator will measure the amount in minimum time. When the identity of the radionuclide is not known, this instrument will screen a large number of people and pick out those who count above normal (these may be few and far between) for more detailed study in a NaI (Tl) human spectrometer. Negative values on potentially exposed personnel are of considerable value for exposure records. This system has been in operation at this laboratory for about 2 years and has proved most satisfactory.

LIQUID SCINTILLATORS

Three large liquid scintillators for counting people have been developed and built at this laboratory. Some of their characteristics are summarized in table 1. The first detector (Humco I) was put into operation in 1955 and has been the workhorse. About 4,032

From Los Alamos Scientific Laboratory, University of California, Los Alamos, New Mexico. Presented on 9 May 1959 in a symposium, "The Acute Radiation Syndrome," at the U.S. Naval Medical School, Bethesda, Maryland. This study is based on work performed under the auspices of the U.S. Atomic Energy Commission.

Table 1. ***Characteristics of 3 large liquid scintillators***

Characteristic	*Humco I*	*Genco*	*Humco II*
Percent photocathode	1.6	13	24
Liquid thickness (inches)	6	6	12
Liquid volume (gallons)	140	70	425
Photomultiplier type	DuMont 6292	DuMont K-1328	DuMont K-1328
Number of photomultipliers	108	6	24
Statistical precision (2-minute measurement)			
K^{40}	±3%	±3%	±1.5%*
	±0.0003 μc	±0.0003 μc	±0.00015 μc
Cs^{137}	±0.0008 μc	±0.0006 μc	±0.0004 μc*
Sr^{90}	barely detectable	±0.03 μc	±0.03 μc*

*Estimated.

people and 4,435 milk samples have been measured in this instrument.[1-3] The detector unit removed from the lead shield is shown in figure 1.

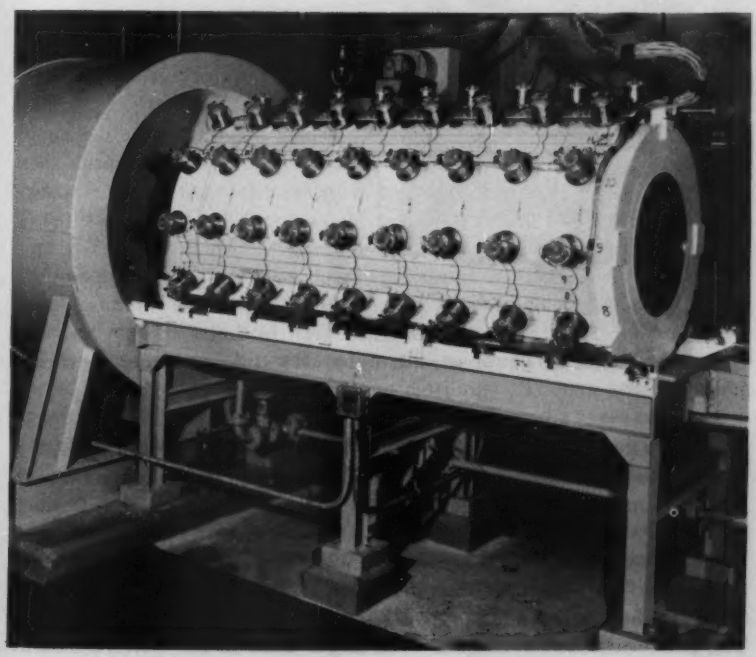

Figure 1. Humco I detector unit.

An improved 2π version was built for and operated at the 1958 Geneva Atoms for Peace Conference.[4] The photocathode coverage was increased from 1.6 to 13 percent by use of six 16-inch DuMont photomultipliers, reducing the tube noise threshold to about 90 kev. The liquid scintillator is triethylbenzene in which are dissolved p-terphenyl (3 grams per liter) and POPOP or 1-4-[bis (2-5 phenyl-oxazole benzene)] (0.03 gram per liter). The subject stands (fig. 2) in a half-cylindrical space 6 feet high and 1½ feet in diameter. The 3-inch thick lead shield is of snail-shell design so that no door is re-

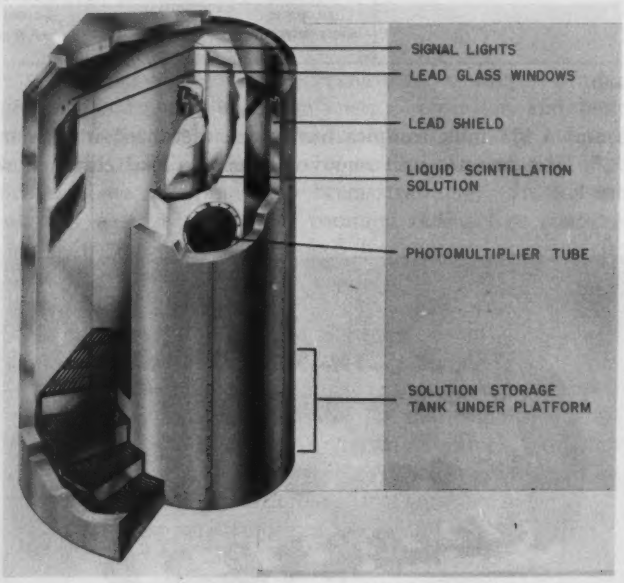

Figure 2. Genco, 2π liquid scintillator at 1958 Geneva Atoms for Peace Conference.

quired. During the 2-week period of the Geneva conference, 4,255 people were measured for K^{40} with the machine operating at about half the maximum capacity. These data will be discussed more thoroughly later.

A new version of Humco I is now being completed for use at this laboratory. It (fig. 3) continues the design trend of the Geneva counter, the main difference being that it is a 4π, horizontal system. The photocathode coverage is even larger than in the Geneva instrument, and this is expected to reduce the noise level below 90 kev.

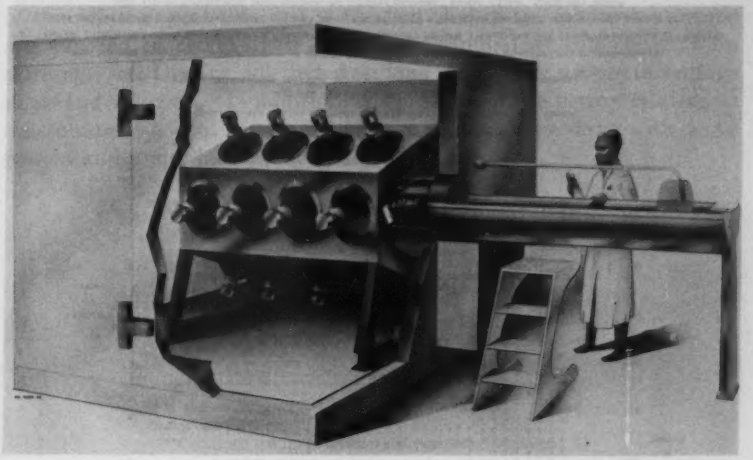

Figure 3. Humco II, improved model of original Los Alamos human counter (Humco I).

GENEVA MEASUREMENTS

At the 1958 Geneva Atoms for Peace Conference, the ability of a large liquid scintillator to measure rapidly a large number of people was clearly demonstrated. Those measured merely removed their shoes and stood in the counter for 40 seconds. Pulses from a channel centered on 1.2 mev (the energy of the Compton edge of the K^{40} gamma rays) were recorded. Statistical precision was 7 percent on an average K^{40} determination. In almost all cases K^{40} was the dominant radioisotope. There were, however, about 20 instances of definitely elevated counts. These turned out to be occupational workers in the nuclear science field and were referred to the NaI (T1) spectrometer at the French exhibit. $Cobalt^{60}$ and radium contamination were found to be most common, often on clothing. There were 2 amusing incidents: A boy counted very high because he had a piece of uranium ore in his pocket; and a man who counted high insisted that he was not wearing a wrist watch, but it turned out that he carried a radium-dial pocket watch!

The great majority of persons measured at Geneva, however, showed mainly K^{40}. The accumulated measurements were processed daily by an IBM–650 computer, and the results were printed out as a frequency distribution (fig. 4). A summary of the results is given in tables 2 and 3. It is clear that the observed standard deviation is greater than that observed under laboratory conditions. A large part

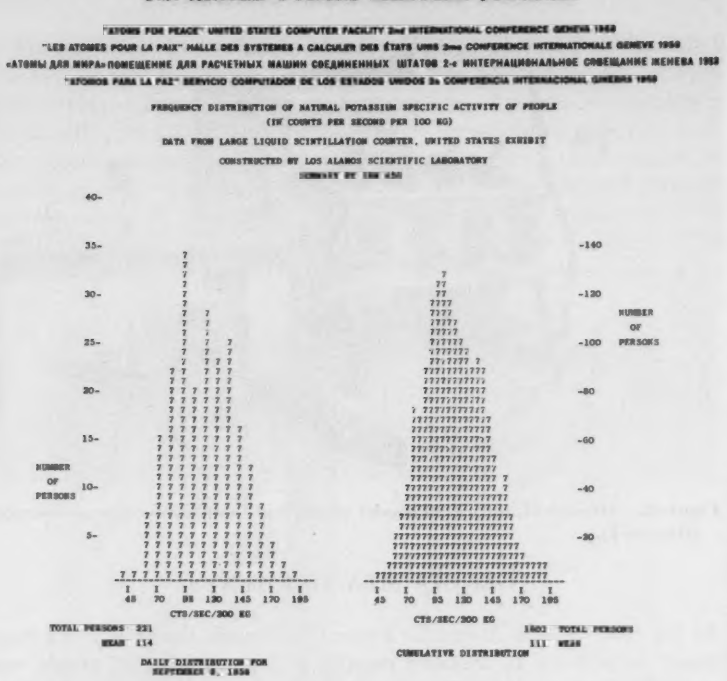
"ATOMS FOR PEACE" UNITED STATES COMPUTER FACILITY 2nd INTERNATIONAL CONFERENCE GENEVA 1958
"LES ATOMES POUR LA PAIX" HALLE DES SYSTEMES A CALCULER DES ÉTATS UNIS 2me CONFERENCE INTERNATIONALE GENEVE 1958
«АТОМЫ ДЛЯ МИРА» ПОМЕЩЕНИЕ ДЛЯ РАСЧЕТНЫХ МАШИН СОЕДИНЕННЫХ ШТАТОВ 2-е ИНТЕРНАЦИОНАЛЬНОЕ СОВЕЩАНИЕ ЖЕНЕВА 1958
"ATOMOS PARA LA PAZ" SERVICIO COMPUTADOR DE LOS ESTADOS UNIDOS 2a CONFERENCIA INTERNACIONAL GINEBRA 1958
FREQUENCY DISTRIBUTION OF NATURAL POTASSIUM SPECIFIC ACTIVITY OF PEOPLE
(IN COUNTS PER SECOND PER 100 KG)
DATA FROM LARGE LIQUID SCINTILLATION COUNTER, UNITED STATES EXHIBIT
CONSTRUCTED BY LOS ALAMOS SCIENTIFIC LABORATORY
NUMBER OF PERSONS
CTS/SEC/300 KG
TOTAL PERSONS 231
MEAN 114
DAILY DISTRIBUTION FOR SEPTEMBER 6, 1958
CUMULATIVE DISTRIBUTION
1601 TOTAL PERSONS
111 MEAN

Figure 4. IBM–650 print-out of Genco measurements, Geneva (1958).

Table 2. *Measurements on people (1958 Geneva conference)*

Date (September)	*Average gamma count (c/sec/200 kg)*	*Number of subjects*
2	107	226
3	111	241
4	110	238
5	112	238
6	112	324
7	108	168
8	113	229
9	114	256
10	110	507
11	109	403
12	115	377
	112	3207
	Before 2 Sept.	518
	After 12 Sept.	530
	Grand total	4255

of this effect is probably due to the fact that in the laboratory people are counted in clean scrub suits, thus eliminating radioactivity on clothing. At Geneva, all that was done was to ask people to remove shoes and watches. In addition, the position of the person relative to the counter was not standardized as well as can be done with a 4π system and under laboratory conditions.

Table 3. ***Percentage standard deviation of K^{40} measurements at 1958 Geneva conference***

Observed general population	*Counting statistics**	*Expected***	*Observed (individual)*	*Observed (daily mean)*
14	7	16	23	2

*Count of 40 seconds on person (35 c/s average net rate) and background (105 c/s).

**Combined counting statistics and population variation.

SCREENING AND IDENTIFICATION

In cases of accidents, one usually has a large number of people, some of whom may be contaminated with unknown radioactivity. Our procedure is to run all through Humco I quickly, and study those who count above normal in our NaI (Tl) human spectrometer.[5] Now the superior energy resolution of the crystal (figs. 5 and 6) becomes important. This situation occurred at this laboratory, in April 1959,

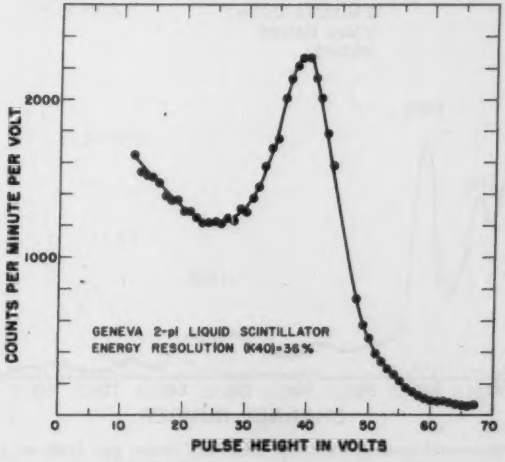

Figure 5. K^{40} **spectrum, Genco.**

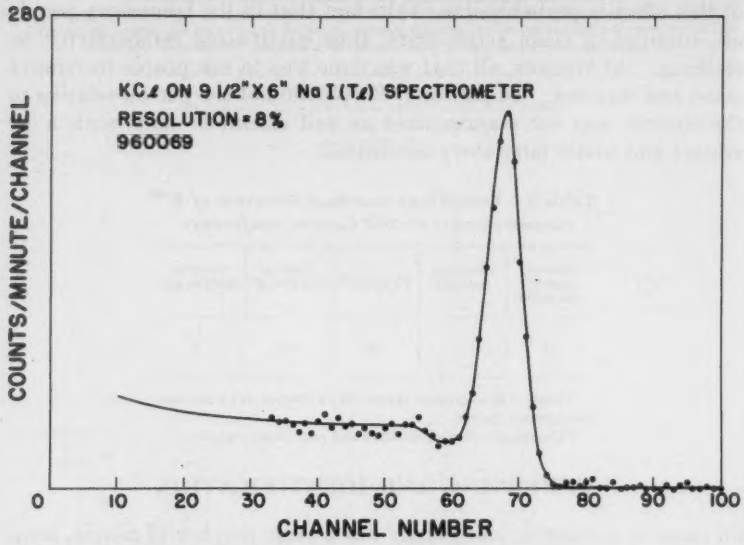

Figure 6. Potassium[40] spectrum, LASL 9½-inch by 6-inch NaI (Tl) human spectrometer.

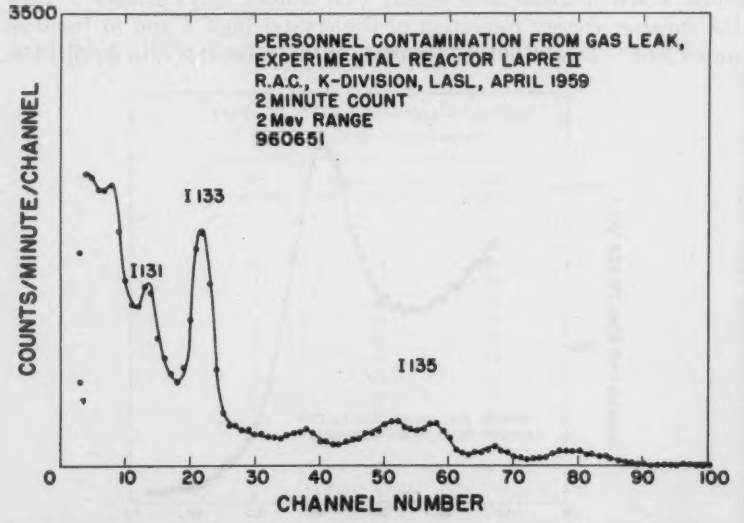

Figure 7. Personnel contamination (R.A.C.) from gas leak at Lapre II experimental reactor, LASL human spectrometer.

as a result of a gas leak at an experimental reactor (Lapre II). Screening of the personnel involved showed a few contaminated. The spectrum of one of these (R.A.C.) is shown in figure 7. From the energy and half-lives of the peaks, I^{131}, I^{133}, and I^{135} were identified; the amounts present could be estimated by an I^{131} calibration and decay scheme data.

The effectiveness of the liquid scintillator-crystal spectrometer team was well demonstrated again at the meeting of the Medical Advisory Board of the Atomic Energy Commission at Los Alamos on 15 March 1958. The members were counted in Humco I; all were normal except one (H.B.G.), whose excess activity was identified as Co^{60} by the crystal spectrometer. It was then recalled that this member had participated as a volunteer in an experiment involving Co^{60}-labeled Vitamin B_{12} about a year previously.

BREMSSTRAHLUNG COUNTING

The main advantage of increased photocathode coverage is ability to measure lower energy radiation. Of considerable interest in this connection is Sr^{90}/Y^{90}, which emits hard beta rays (E_{max}=2.2 mev)

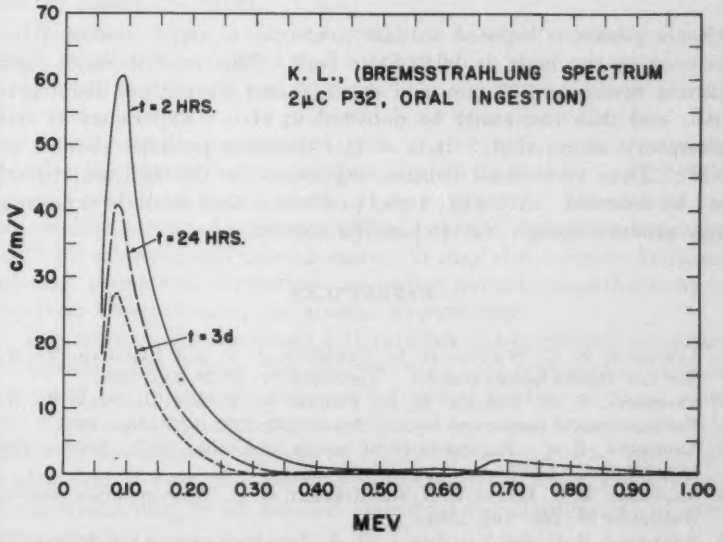

Figure 8. Bremsstrahlung spectrum (K.L.) after ingestion of P^{32}, using 8-inch by 4-inch LASL human spectrometer.

and, hence, a continuous x-ray spectrum (bremsstrahlung). The general nature of this spectrum is shown in fig. 8, which was obtained with an 8-inch by 4-inch NaI (Tl) spectrometer from a subject who had ingested 2 μc of P^{32} (E_{max}=1.7 mev). Note that the spectrum rises rapidly at the low energies. The drop below 80 kev is due to absorption in the copper can in which the crystal is mounted and in the body tissues. Thus, low-level detection of hard beta-ray emitters by means of their bremsstrahlung must be done in the low-energy region (between about 50 to 200 kev). This is why it is important that the newer large liquid scintillators are able to look down to 90 kev and, perhaps, below.

Measurements with a Sr^{90}/Y^{90} source in a 70-pound phantom on the 2π Geneva counter gave a counting efficiency of 0.3 percent and an estimated lower limit of detection of about 0.03 μc. This is a factor of 30 below the maximum permissible level for occupational workers (1 μc) but above present levels in the general population. Of course, there is very little that one can do to identify the beta emitter, since the only difference between bremsstrahlung spectra is their poorly defined end points.

NEUTRON EXPOSURE

After a person is exposed to fast neutrons, a major radioactivity induced in the body is 14.97-hour Na^{24}. This nuclide emits hard gamma rays (one 1.37 mev and one 2.75 mev photon per disintegration) and thus can easily be detected in vivo. Experience at this laboratory shows that 3 rads of fast neutrons produce about 1 μc Na^{24}. Thus very small neutron exposures (in the millirad region) can be detected. Actually, a real problem is that medium exposures may produce enough Na^{24} to jam the counter.

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Idiopathic Orthostatic Hypotension and Its Relationship to Positive G Tolerance

COMMANDER JERRY J. ZARRIELLO, MC, USN

THE PHYSIOLOGIC CARDIOVASCULAR MECHANISM controlling blood pressure and blood flow in the vertical stance in man is a complicated one. The upright posture requires a delicate balance of many reflexes that in terms of adaptation is not always perfect. The evolution from a quadriped to a biped has imposed certain cardiovascular penalties. This paper will confine itself to the problem of orthostatic hypotension and will present 2 cases demonstrating decreased positive G tolerance on the human centrifuge.

Orthostatic hypotension is a syndrome in which assuming the upright position is associated with marked fall in blood pressure, which may result in dizziness and syncope. The syndrome of classic chronic postural or orthostatic hypotension is an uncommon disorder.[1] This condition may be precipitated even in the presence of a normally functioning sympathetic nervous system whenever exaggerated venous pooling of blood occurs. It may be seen in older people and in cerebral arteriosclerosis, peripheral neuritis, diabetic neuropathy, multiple sclerosis, and tabes dorsalis. It may also occur in Addison's disease, in marked varicosities, and after partial sympathectomy or bilateral adrenalectomy for arterial hypertension.

This report is not concerned with orthostatic hypotension secondary to disease. The 2 cases that are presented here represent a failure of sympathetic impulses to respond to normal pooling of blood when the upright position is assumed—a loss or depressed sensitivity of the reflex vasoconstrictor response to a fall in blood pressure. Sodeman [2] states that if only the postural vasoconstrictor fibers are affected, hypotension may be an isolated finding; if the involvement of sym-

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pathetic fibers is sufficiently extensive, anhidrosis, pallor, and failure of the heart rate to increase will be associated with the fall in blood pressure. The critical level below which patients with orthostatic hypotension are reported to have symptoms is a systolic blood pressure of 50 mm/Hg.[3] In 1925, reporting the occurrence of the hitherto unrecognized clinical phenomenon of orthostatic hypotension in 3 men, all of whom sustained a fall in systolic and diastolic blood pressure on assuming the upright position, Bradbury and Eggleston [4] concluded that the syndrome was due to paralysis of sympathetic vasoconstrictor endings. Ellis and Haynes [5] stated that patients with orthostatic hypotension do not pool more blood in the lower part of the body than do normal subjects under similar circumstances but attributed the phenomenon to pooling of a normal amount of blood. Stead and Ebert [6] stated that absence of the reflex vasoconstriction that maintains the arterial pressure in normal subjects is the fundamental disturbance in orthostatic hypotension.

MacLean and Allen [7] proposed that orthostatic hypotension is a circulation defect caused by inadequate venous return in the erect position, the result either of pooling of abnormal quantities of blood in the lower extremities or of very rapid transudation of circulating fluid into the tissues of the lower extremities. The rapidity of onset of the deficiency when the upright position is assumed and the instantaneous recovery in the recumbent state suggest that the site of pooling is the capillary venous bed. Hickham and Pryor [8] concluded that postural hypotension resulted primarily from inadequate arteriolar constriction and was often intensified by a large fall in cardiac output, ascribed to abnormal dilatation of the venous system in the erect posture and resultant decrease in return of venous blood to the heart.

Table 1. ***Comparison of G tolerance in 115 normal and 2 orthostatic hypotensive subjects***

Subjects	*Mean G level*			
	Clear	*80° light loss 115 normals*	*Blackout 67 normals*	*Unconscious 23 normals*
Normals	3.6	4.2±0.6 (3.2–6.2)	4.9±0.7 (3.75–6.7)	5.1±0.8 (4.0–6.7)
Case 1 (3 series)	3.0	3.5 (3.4–3.8)	3.8 (3.6–4.2)	4.0 (3.8–4.5)
Case 2 (4 series)	2.3	3.1 (2.95–3.5)	3.6 (3.5–3.7)	4.3 (3.95–4.9)

Luft and Von Euler [9] demonstrated a marked decrease in spontaneous urinary excretion of norepinephrine and equivocally depressed values for epinephrine in 2 cases of postural hypotension. On tilting normal subjects upright to 75 degrees, Sundin [10] demonstrated by bioassay a fourfold increase in the rate of urinary excretion of epinephrine and norepinephrine.

In our review of the literature, we were unable to find any reported cases of orthostatic hypotension that have been subjected to increased gravitational force. Two cases of orthostatic hypotension are reported briefly, and their levels of grayout, blackout, and unconsciousness are compared to those of 115 normal cases that have been subjected to positive radial acceleratory forces (table 1).

CASE REPORTS

CASE 1. This 23-year-old second lieutenant, U.S. Air Force pilot trainee, with 115 hours of flying time was referred to the acceleration unit of this school because of 3 episodes of unconsciousness lasting 30 seconds or longer during aerobatic maneuvers in aircraft of T–28 type. The patient had commenced his flying phase in January 1957, and his initial flights were performed in aircraft of T–34 type. He stated that at no time during flight in a T–34 aircraft had he experienced any untoward physiologic reactions to acceleratory force even though he had performed loops, aileron rolls, vertical recoveries, barrel rolls, Immelmans, and other maneuvers. When he progressed from the T–34 aircraft to the T–28 aircraft, he began to notice grayout while performing tight chandelle maneuvers followed by the 3 episodes of unconsciousness during flight in a T–28 aircraft.

The first incident of unconsciousness occurred in May 1957 and involved a series of consecutive aileron rolls, which was begun with the nose of the aircraft below the horizon; the plane lost altitude during the rolls, and kept falling, gaining excessive airspeed. During the pullout, the patient was rendered unconscious. When he regained consciousness and was able to respond appropriately to his environment, he found the aircraft in a series of excessive back-pressure stalls. He eliminated the stall by forward pressure on the stick, and resumed straight and level flight. He noticed that his earphones were lying on the deck, having been displaced during his episode of unconsciousness.

Two weeks later, the second episode of unconsciousness occurred while the pilot trainee was performing loops in a T–28 aircraft. During one loop he performed a "tight" pullup; and as the aircraft approached the top of the loop, he noticed graying, grayout, and blackout, which progressed to unconsciousness. When he recovered consciousness, the plane was flying straight and level.

On 15 July 1957, while flying in a T–28 aircraft under dual control, he and his instructor performed 4 Immelmans. During the first 3 Immelmans he experienced no untoward physiologic reactions. His instructor stated that during the fourth Immelman, apparently performed similarly to the preceding 3, the student experienced a clonic, convulsive seizure that persisted for 15 to 30 seconds, during which he became unconscious without any preceding signs of graying, grayout, or blackout. The instructor did not experience any untoward symptoms.

There was no past history of orthostatic hypotension, episodes of unconscious-

ness, or fainting prior to the history that has been recounted. The consultation request stated that the subject's reclining blood pressure was 120/60 mm Hg, his standing blood pressure 80/50 mm Hg. His past history, family history, and social history were essentially noncontributory. He was a well-adjusted, stable, intelligent young man. There appeared to be nothing in the 24-hour period preceding each flight that could have contributed to the causation of symptoms.

Physical examination, which revealed a tall (6 feet 4 inches), well-developed, young white man in no acute distress, was normal except for the blood pressure readings. Standing blood pressure was 106/60 mm Hg, pulse rate 96 per minute. Reclining blood pressure was 118/70 mm Hg, pulse rate 68 per minute. The fourth-stage Valsalva systolic blood pressure rise was 1 mm Hg. All blood pressure readings were made by the auscultatory method using an aneroid manometer.

Blood pressure readings were recorded again on the following day. Reclining blood pressure was 118/70 mm Hg, standing blood pressure 90/45 mm Hg. Blood pressure after standing for 1 minute was 92/60 mm Hg; 2 minutes, 92/64 mm Hg; 3 minutes 96/60 mm Hg; 5 minutes, 96/68 mm Hg; 10 minutes 90/66 mm Hg; and 20 minutes, 90/60 mm Hg. This procedure was repeated on several occasions, and although evidence of a substantial drop in blood pressure was obtained each time, the subject did not experience any of the classic symptoms of orthostatic hypotension.

The white blood cell count was 8,600 per cu mm, with neutrophils 55 percent, lymphocytes 36 percent, eosinophils 6 percent, basophils 1 percent, and bands 2 percent. The red blood cell count was 5,040,000 per cu mm, hematocrit 40 ml per 100 ml. The sedimentation rate (Wintrobe method) was 1 mm in 15 minutes, 4 mm in 30 minutes, 6 mm in 45 minutes, and 8 mm in 60 minutes. Carbon dioxide-combining power was 70 ml per 100 ml. Stool examinations for ova and parasites were negative on 2 occasions. The urine was straw colored and cloudy, with pH 7.5 and specific gravity 1.018, negative for albumin, sugar, and acetone by qualitative tests. Glucose tolerance test was normal. The electroencephalogram was interpreted as normal during rest and hyperventilation.

Cardiovascular consultation revealed that the electrocardiogram was within normal limits. Chest roentgenogram showed normal cardiac outline and normal lung fields. The cardiac consultant believed that this man had clinical evidence suggestive of orthostatic hypotension.

Centrifuge tests performed in the usual manner [11] during 3 series of centrifuge runs on 3 different days revealed that this subject experienced grayout (80-degree light loss) at a mean of 3.5 G. His mean blackout level was found to occur at 3.8 G, and his mean unconsciousness level at 4.0 G. These tolerance levels are below the normals, as shown in table 1.

CASE 2. This 23-year-old officer candidate was referred from U.S. Naval Air Auxiliary Station, Saufley Field, Florida, to the acceleration unit because of several episodes of unconsciousness during spins and loops in aircraft of T-34B type. No history of symptoms suggestive of orthostatic hypotension was elicited. The patient's family history, past history, and social history were noncontributory.

All routine laboratory examinations were reported as normal, as were the electrocardiogram and electroencephalogram. A glucose tolerance test on 11 April 1957 revealed normal fasting blood glucose with a flat type of glucose tolerance curve.

Physical examination on 25 April 1957 was essentially normal except for evidence of postural hypotension. Reclining blood pressure was 106/64 mm Hg, pulse

rate 84 per minute. Standing blood pressure was 92/58 mm Hg, pulse 112 per minute. Blood pressure after standing for 1 minute was 100/58 mm Hg. Tilt table tests were reported as follows:

	Blood pressure mm Hg	*Pulse, rate per minute*
initial supine	104/62	76
5 minutes supine	106/64	70
initial (—37°) head down	106/80	72
2 minutes (—37°) head down	100/70	64
4 minutes (—37°) head down	100/80	64
return to horizontal	104/64	72
5 minutes horizontal	110/70	66
vertical and (75°) initial	82/60	110
2 minutes (75°)	82/60	108
4 minutes (75°)	80/60	108
return to horizontal	112/64	60
5 minutes horizontal	110/66	64
10 minutes horizontal	108/60	68
vertical 2 minutes	80/60	112
horizontal	114/50	68

The patient was believed to be subject to postural hypotension with inadequate protective vasomotor reflexes.

Centrifuge tests performed in the manner usual in relaxed subjects [11] during 4 series of centrifuge runs on 4 different days revealed that this patient experienced grayout (80-degree light loss) at a mean of 3.1 G. His mean blackout level was found to be 3.6 G and his mean unconsciousness level 4.3 G.

DISCUSSION

In the past 2 years, 26 subjects have been referred to the acceleration unit because of evidence of lowered G tolerance during actual aircraft flight. Most of them developed symptoms, especially unconsciousness, in aircraft performing aerobatic maneuvers. The responses of the great majority of this group were found to be within the normal limits for positive G tolerance except for the 2 cases presented in this report. It was determined that both of these patients had orthostatic or postural hypotension despite the fact that they experienced no untoward symptoms under the earth's normal gravitational force. In the horizontal position the gravitational force is transverse to the long hydrostatic columns of the body. When the reclining subject assumes the vertical stance or upright position, he is subjected to the earth's gravitational force in a positive G fashion, so that because of the force of inertia blood tends to gravitate to the areas below the level of the heart. These patients both experienced a significant fall in systolic and diastolic blood pressure at the level of the brachial artery, but the fall in blood pressure was not sufficient to cause the classic symptoms of postural or orthostatic hypotension.

However, under increased gravitational (centripetal-centrifugal) force their inability to maintain their blood pressure adequately was intensified to the point that they experienced visual symptoms and unconsciousness at positive G levels lower than normal subjects. To our knowledge and after review of the literature, cases of orthostatic or postural hypotension showing this decrease in positive G tolerance under increased acceleratory force have not been reported previously.

The data suggest that centrifugation may be used as an adjunct in the diagnosis of early cases of postural or orthostatic hypotension prior to the development of classic symptoms of the disease.

These cases represent orthostatic hypotension with a moderate fall in blood pressure occurring when the subjects assumed the erect position. The "peripheral" defect is apparently a primary disorder in the efferent preganglionic or postganglionic sympathetic nervous pathways since there was no associated underlying organic disease to explain a "central" origin. Describing 4 cases of severe orthostatic hypotension, Barnett, Hamilton, and Kay [12] showed that in 3 of these the lesion was "peripheral" (in the efferent sympathetic nervous pathways) and in the fourth "central" (in the neuraxis, above the origin of the preganglionic sympathetic nerves). The nature of the underlying lesion in our cases is obscure and apparently not sufficient as yet for these 2 subjects to have developed classic symptoms of orthostatic hypotension under natural terrestial circumstances. Under conditions occurring in military aerobatic flights, however, these patients developed symptoms more readily than normal because of the hypotensive effects of positive radial G. This was confirmed in the laboratory when these men were subjected to positive G under control circumstances, and grayout, blackout, and unconsciousness occurred at lower levels than normals. Because of these reasons, these men were eliminated from the military flight program.

SUMMARY

The literature on idiopathic orthostatic hypotension is reviewed, and the suggested physiologic mechanisms for the phenomenon are outlined. Two cases of orthostatic hypotension are reported, both unrecognized until unconsciousness occurred during flying maneuvers. The hypotensive effects of increased gravitational force upon these men were confirmed in the laboratory, where human centrifuge tests demonstrated lower levels for grayout, blackout, and unconsciousness in both subjects than in normal controls. It is suggested that centrifugation may be used as an adjunct in the diagnosis of early cases of postural hypotension.

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GOOD LUCK AND A GOOD WIFE

In addition to medical knowledge and to skill in its application, many intangible factors enter into success in the practice of medicine—motivation, energy, drive, the ability to work long hours, attention to duty, empathy with patients, physical health, emotional stability, a happy choice of location, not to mention "good luck" and "a good wife." It would be hard enough to measure a doctor's relative competence in a community under any circumstances and by any means, but to assess the importance of these intangibles would immeasurably compound the difficulties.—JOHN MCK. MITCHELL: Medical Education and American Specialty Boards. *The Journal of Medical Education*, June 1959.

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Failure in Temperature Regulation During Progressive Dehydration

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THE PRINCIPAL THESIS of this article is this: Dehydration raises the thermal threshold for sweating, heat storage correspondingly increases, and each increment in body temperature provides additional stimulation to the regulatory mechanism whose reactivity is diminishing. An increasingly precarious equlibrium is almost attained between heat exchanges with the environment and heat production in the body, but at the expense of progressively higher body temperatures. In this sense, dehydration elicits failure in temperature regulation during exposure to heat.

The following data support this interpretation: Exercise either in the field [1, 2] or in the climate chamber [3, 4] elicited greater increases in the body temperatures of dehydrated subjects than of those whose hydration was maintained, if heat transfers required sweating. Depression of the latter was demonstrated clearly. In combinations of dry heat with work, a depression of sweating was evident in the first hour of dehydration; the depression was greatest when water was depleted and the salt balance was maintained; sweat rates were highest with water balance and salt depletion and less with both water and salt balance.[2, 3] The changes in body temperatures correlated with these variations in the sweating responses. But if a normal resting subject was dehydrated to 5 percent of the body weight by exposure to 115° F and then brought back to the comfortable ambient temperature of 78° F, the rectal temperature, which was elevated by the combination of heat and dehydration, returned to normal levels.[5] A clue to the altered relation of sweat rates to body temperatures

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during dehydration was provided in the earlier experiments of Dontas,[6] who demonstrated that the sweating response of man and the panting response of the dog to heat are depressed by an increase in the osmotic pressure of the body fluids resulting either from withholding water or from giving salt. The implications of these observations for the management of clinical dehydration during hot weather are clear.

Fatigue of the sweating mechanism, possibly at the glandular level, has been postulated in explanation of a decline in sweating during heavy exercise in the heat[7] and during rest in the hot climate chamber.[8] In the latter studies, total sweat ouput and forearm sweating decreased, the output from the individual gland became less, the responses of the glands to acetyl-β-methylcholine (Mecholyl) diminished and body temperatures rose. Whether or not the additional pharmacologic data may be considered as evidence of a kind of glandular fatigue, calculations that may be made of the osmotic work performed by the sweat gland suggest that a very large reduction must occur in the cutaneous blood flow if the fatigue is due to this factor. Thus, when the osmotic work amounted to 10 gm cal per minute for the entire body surface during profuse sweating[9] the energy requirements would have been satisfied by only 2 ml of oxygen or some proportionately larger but still small quantity, if the efficiency of the gland were relatively low. It is extremely doubtful that the blood supply to the gland would fall to such a low level that fatigue for this reason would occur.

There seems to have been acceptance[10] of the suggestion by Adolph[1, 11] that peripheral circulatory failure accompanying the decrease in plasma volume (elicited by the dehydration) accounted for the progressive rise in body temperature during dehydration combined with heat stress, by reducing convective heat transfer to the skin by the blood stream. Calculations of conductances from the data of Grande and associates[4] indicate considerable reductions of the cutaneous blood flow in these circumstances. However, the equation for heat transfer to the surface of the body

$$\text{Heat} = \text{conductance } (T_{core} - T_{skin})$$

—in which conductance is due principally to cutaneous blood flow—shows that a reduction in conductance may be compensated by increasing the difference between internal and surface temperatures. This actually happens in acclimatization to heat; cutaneous blood flows are less rather than greater. Instead of the higher body temperatures that might be postulated as resulting from the decreased blood flows, the converse is noted.[12]

Adolph[1] interpreted his indexes of the changes in plasma volume as showing that the blood contributed relatively more water to the sweat gland than did the body as a whole. This is doubtful. Filtration of plasma may have accounted in large part for the observed reduction in the circulating plasma volume.[13]

In reviewing such published experiences, we were impressed by the need for experiments in which the sequence of events might be more clearly recognized. By reducing the heat loads to levels considerably below the tolerances of the subjects, the time axis would be extended and the relations of the several events in the regulation of the body temperatures might be defined more clearly. Two questions were asked:

1. If a resting nude subject is exposed to a steady standard heat load that could be accepted, after the initial thermal equilibration, without further change in body temperatures and sweating, might the exposure be continued indefinitely without impairment in temperature regulation as indexed by the relation of sweating to the body temperatures, provided the normal hydration of the subject was maintained throughout the exposure? Such a study obviously presented a deviation from the usual diurnal variation in exposure to heat.

2. If exposure to the same ambient conditions were repeated, but with the additional variable of progressive dehydration of the subject, would the regulation of body temperature be impaired early in the development of the stress?

Observation was directed principally to total and regional sweating rates, oral and skin temperatures, and indexes of the cutaneous blood flow.

TEMPERATURE REGULATION IN HYDRATED SUBJECTS

The subject entered the climate chamber at 0800 hours of the first day and remained there until the conclusion of the observations 32 hours later on the second day. Meals were given regularly at 0600, 1200, and 1800 hours and a midnight snack was also offered. Body weight was maintained additionally by the frequent drinking of 0.1 percent saline solution in exact amount to compensate for weight losses. Sleep was fitful and inadequate. The subjects complained of boredom, despite phonograph music and reading. All were very tired at the conclusion of the run.

Skin temperatures were recorded by thermocouples placed on the same 10 regions on which sweating was measured by means of desiccating capsules.[14] Mean skin temperatures were estimated from

Table 1. ***Mean skin (T_S) and mean oral (T_O) temperatures of 3 subjects in six 32-hour exposures to 43.3°C***

Subject	Experiment	Period 1		Period 2		Period 3		Period 4	
		T_S	T_O	T_S	T_O	T_S	T_O	T_S	T_O
1	1	36. 4	36. 8	36. 3	36. 8	36. 3	36. 4	36. 3	36. 8
1	2	35. 4	37. 1	36. 2	36. 9	35. 9	37. 2	35. 6	37. 2
2	1	36. 4	37. 0	36. 6	37. 2	36. 2	37. 0	36. 4	37. 0
2	2	36. 5	37. 1	36. 4	37. 2	36. 2	37. 1	36. 2	37. 3
3	1	36. 5	37. 0	36. 8	37. 0	36. 6	37. 3	36. 6	36. 9
3	2	36. 3	37. 1	36. 3	37. 2	36. 9	37. 3	36. 8	37. 3

these readings. Oral temperatures were measured with a clinical thermometer after the subject had kept the mouth closed for at least 5 minutes before the insertion of the thermometer. Total sweat rates were calculated from changes in body weight, if any, urine output, and measured ingestion of water and food. Observations were made during 135-minute periods at 0900 and 1400 hours of each day. Climate chamber control was precise throughout each run, with maximum deviations of 0.2°C in the dry- and wet-bulb temperatures of 43.3° and 30.3°C, respectively.

Three lean subjects were studied in repeat experiments. All observations were made on the supine subject lying on a screen of stainless steel.

Results

The means of the skin and oral temperatures during each observational period are listed in table 1. Although small fluctuations in these values were recorded during each observational period, no systematic trends were exhibited. Slight differences in the levels of the body temperatures were observed in successive experiments on the same subject.

Variations in the rates of weight loss did not exceed 10 percent of the mean rate for the 4 observational periods. This point is illustrated in table 2, in which the averages of the sweating rates of the 4 areas on the lower extremity have also been entered for comparison with the rates of weight loss. As with the latter, these regional rates of sweating showed no consistent change as the exposure continued.

These findings clearly show that chamber climates that elicited weight losses at rates of 150 to 190 gm per square meter per hour and sweating over the whole body surface were accepted continuously by the subjects for 32 hours without appreciable rise in body tem-

Table 2. *Rate of weight loss and average of sweating rates on 4 areas of lower extremity during each observational period of 2.25 hours while subject was exposed continuously to 43.3°C (Rates: gm per square meter per hour)*

Subject	*Experiment*	*Period*	*Weight loss*	*Sweating on lower extremity*
1	1	1	181	216
		2	183	264
		3	187	216
		4	172	200
2	2	1	170	258
		2	151	257
		3	155	222
		4	155	246

peratures and without any change in the total sweat output after the initial phase of thermal equilibration, provided that the hydration of the subject was maintained. There was no evidence of fatigue of sweating, either in the total sweat output or in rates of sweating on individual regions of the body. Cutaneous blood flows, as indexed by conductances, also remained unchanged. Whether or not this particular exposure could be continued indefinitely was not determined. However, the increasing psychologic stress during the exposure would have interfered with a strictly physiologic experiment. If the sweating rate on the forehead could be considered an index of psychic stress, the latter obviously increased during the exposure.

In experiments, such as those reported here, in which resting subjects are exposed to precisely controlled ambient conditions, it is essential to know the variability in and reliability of the sweating rates during the exposures. The apparent variations in rates of weight loss illustrated in table 2 may represent the limits of resolution in the drying and weighing procedure rather than the actual changes in total sweat output. A detailed statistical study [15, 16] of measurements of regional sweating rates demonstrated the greatest variability in these rates on the forehead, chest, and abdomen and the least variability on the lower extremity. This point is illustrated in figure 1, in which rates have been plotted for thigh, abdomen, and forehead during 4 successive observational periods. The data were taken from the present series of experiments. It was also apparent in the statistical study that the topographic pattern of magnitude in regional rates of sweating at any chosen constant ambient temperature was not the same as the topographic pattern of variability in the regional rates at that temperature. This obser-

vation may imply different central neural sites of origin of the 2 topographic patterns. The sweating rates on the lower extremity increased almost linearly with the rise in ambient temperature from 90° to 110°F. These rates appear to be a useful index of thermoregulatory sweating. In contrast, the rates on the forehead varied so much that thermoregulatory sweating was obscured by other influences, possibly psychic.

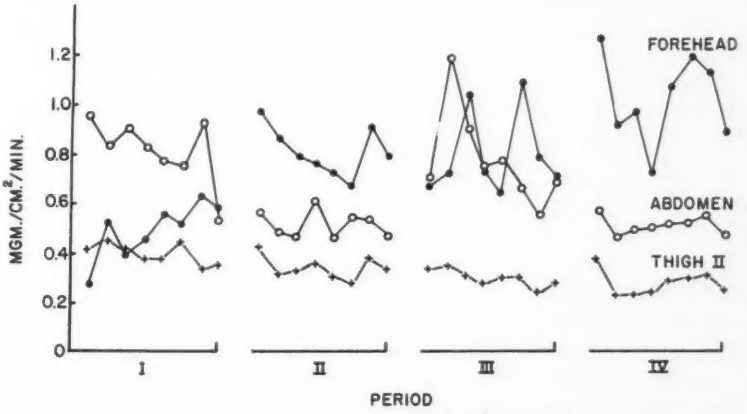

Figure 1. Sweating rates on thigh, abdomen, and forehead during 4 observational periods of 135 minutes at 0900 and 1400 hours of days 1 and 2 of a continuous exposure to 43.3°C.

The influence of the "pressure reflex" in sweating as described by Kawase [17] was evaluated in these experiments. This reflex induces asymmetry in regional sweating rates on the 2 sides of the body when the subject lies on 1 side more than on the other.[18] Instances of asymmetry in regional sweating rates in normal subjects as reported in the literature [19] may have originated in the unrecognized and unsuspected presence of this reflex. In our experiments, regional rates of sweating were measured simultaneously on symmetric areas. Variability in the rates did not exhibit the asymmetry which characterizes the pressure reflex.

FAILURE IN TEMPERATURE REGULATION IN DEHYDRATION

After urinating, the nude subject entered the climate chamber (between 0500 and 0700 hours), where he was weighed as quickly as possible. He then assumed a semireclining position in a specially

designed chair having a back and seat of stainless steel screen. During various periods of the continuous exposure and until the end of the exposure, the following items were recorded: weight losses, skin and oral temperatures, regional sweating rates, electrocardiograms, volume pulses in the finger and toe pads, and urine outputs. In some experiments flicker fusion frequencies were measured. The many recordings and measurements did not permit strict continuity in all data.

Chamber climates provided dry-bulb temperatures of 43.5°C and aqueous vapor pressures of 20.7 to 33.5 mm Hg. Sixteen successful experiments were performed on 14 male subjects, to whom the experiment was explained in advance and who had received indoctrination by trial runs before data were accepted.

Results

Body temperatures

In all subjects, skin and oral temperatures rose throughout the exposures. Figure 2 illustrates this point in 2 repeat experiments on the same subject. Since the subjects entered the chamber in the early hours of the morning when outdoor temperatures were moderate (these experiments were performed during the summer months) and they were correspondingly cool, it seemed preferable to ignore the thermal events during the first 3 hours of exposure and

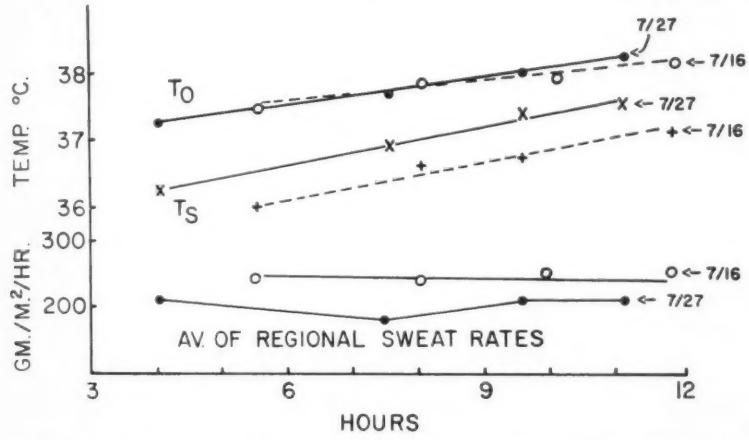

Figure 2. Comparison of averages of regional sweating rates (except in forehead) and body temperatures during continuous progressive dehydration and exposure to 43.3°C. Two experiments (7/16 and 7/27) on separate days on subject 1.

to refer the subsequent changes in body temperatures to the combination of progressive dehydration and the heat load. Such edited data have been entered in table 3. The average rates of increase in the skin and oral temperatures after the third hour of exposure were, respectively, 0.09° and 0.11°C per hour. These rates varied considerably in different subjects. The calculated average rates of heat storage would have been about 3.0 Cal per square meter per hour.

Table 3. ***Increases in body temperatures from third hour of exposure to 43.5°C to end of exposure, duration of exposures, average rate of weight loss during entire exposure in dehydrating subjects (July and August)***

Subject	*Duration of exposure (hrs)*	*Rate of weight loss (%/hr)*	*Skin temperature*		*Oral temperature*	
			3 hrs (° C)	*Rate of increase (° C/hr)*	*3 hrs (° C)*	*Rate of increase (° C/hr)*
1	12. 0	0. 48	36. 5	0. 09	37. 2	0. 13
1	12. 0	0. 47	36. 0	0. 20	36. 9	0. 15
2	12. 0	0. 49	36. 0	0. 06	37. 0	0. 10
3	11. 5	0. 47	36. 4	0. 10	37. 2	0. 15
4	11. 8	0. 40	36. 4	0. 06	37. 1	0. 11
5	11. 5	0. 42	36. 0	0. 09	37. 2	0. 10
6	11. 5	0. 52	36. 1	0. 09	37. 2	0. 09
7	8. 0	0. 54	36. 0	0. 12	37. 2	0. 15
8	12. 0	0. 49	36. 0	0. 08	37. 2	0. 11
8	10. 7	0. 59	36. 3	0. 16	37. 2	0. 16
9	10. 7	0. 50	36. 3	0. 04	37. 5	0. 10
11	11. 0	0. 44	36. 0	0. 05	37. 0	0. 09
12	12. 5	0. 45	36. 4	0. 06	37. 2	0. 12
13	11. 6	0. 51	35. 6	0. 13	37. 0	0. 07
14	10. 7	0. 52	35. 9	0. 09	37. 2	0. 03
Average		0. 48	36. 1	0. 09	37. 1	0. 11

Weight losses

The average rate of weight loss per hour during the whole exposure was 0.48 percent of the initial body weight. Deviations from this rate were less than 10 percent in all but 1 experiment. In 10 of the experiments, data on the rates of weight losses were available for comparisons during the third to the fifth hours and the eighth to the twelfth hours of exposure (table 4). No consistent trends are apparent in these data. The progress of weight loss during the exposure of 1 subject is illustrated in figure 3. The rates appeared to be slightly greater during the first 5 hours than during the last

Table 4. ***Rates of weight loss and conductances (K) during early and late periods of the dehydration runs (Rates: gm/m²/hr; K in Cal/m²/hr/°C)***

Subject	*3–5 hours*		*8–12 hours*	
	Weight loss	*K*	*Weight loss*	*K*
1	176	75	166	58
2	178	52	180	44
3	190	89	184	68
4	154	58	151	37
5	188	48	181	46
6	169	43	178	50
8	See figure 6			
11	167	46	169	40
12	156	52	153	37
14	174	38	179	58

7 hours of exposure. If this difference was real, the implied slight deficit in sweating from the fifth to the twelfth hours would have been about 10 gm per square meter per hour.

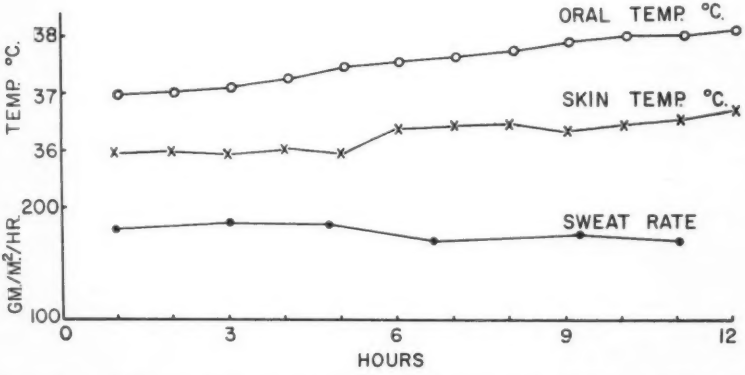

Figure 3. Changes in rates of weight loss (sweat rate) and skin and oral temperatures in 1 subject during continuous exposure to 43.3°C without replacement of lost fluid.

Averages of the regional sweating rates (not including those on the forehead) demonstrated a similar constancy in sweating despite the increases in body temperatures that occurred in all of the experiments. This point is illustrated in the 2 experiments illustrated in figure 2, performed on the same subject but on different days. The body

temperatures increased at the same rates in both experiments but the averages of the regional sweating rates remained very nearly constant. The somewhat higher averages of the regional sweating rates in the first experiment may have been the result of different placements of the capsules on the same regions in the 2 experiments. There was no real difference in the mean rates of weight loss (171 and 168 gm per square meter per hour) in the 2 exposures, although skin temperatures were consistently higher in the second experiment.

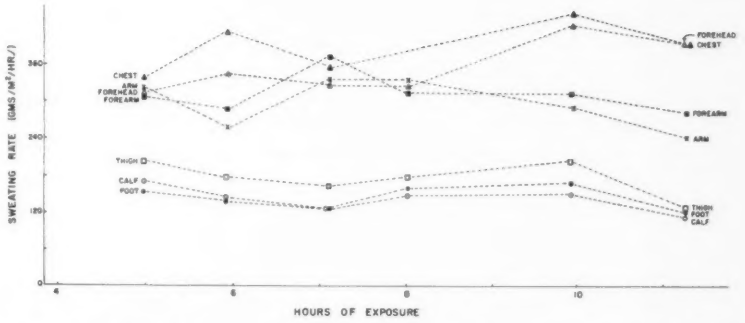

Figure 4. Regional rates of sweating during continuous exposure to 43.3°C combined with progressive dehydration.

Regional sweating rates

There were marked differences among subjects in the topographic patterns of regional sweating, as has been reported in an earlier study.[20] Most of the subjects showed either small variations in the rates on the lower extremity or a tendency for these rates to fall in the latter part of the exposure. Some of the changes in the regional sweating rates are shown in figure 4. Rates on the forehead varied widely among subjects and often rose greatly as the subject's obvious irritation and distress increased. The forehead rates seemed to reflect the latter influences much more than the thermoregulatory needs. Rates on the chest and arm also seemed to be more labile in some subjects than the rates on the lower extremity. These observations further support those that have been listed in several preceding technical reports [15, 16] and emphasize that wide "random" variations in a regional sweating rate during a constant heat load probably originate in factors other than the mechanisms of temperature regulation. It is a curious situation that sweating on the lower extremity seems to be less affected by these other factors, whatever they may be.

The variability in sweating on several regions during the exposures may be illustrated by charting them against the oral temperature, as was done in figure 5. The scatter of rates on the lower extremity was less than on the upper parts of the body. In no region, excepting the forehead, was it possible to detect in all subjects increases in sweating as body temperature rose with the dehydration. These increases in body temperature would have elicited marked increases in sweating in all regions in normally hydrated subjects.[20]

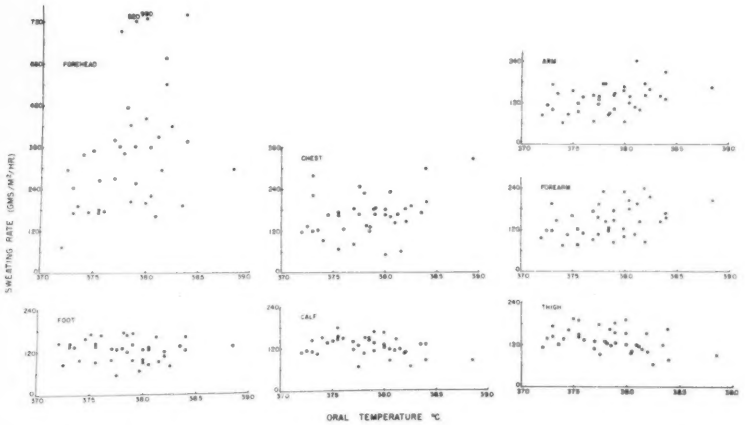

Figure 5. Relation of regional sweating rates to oral temperature.

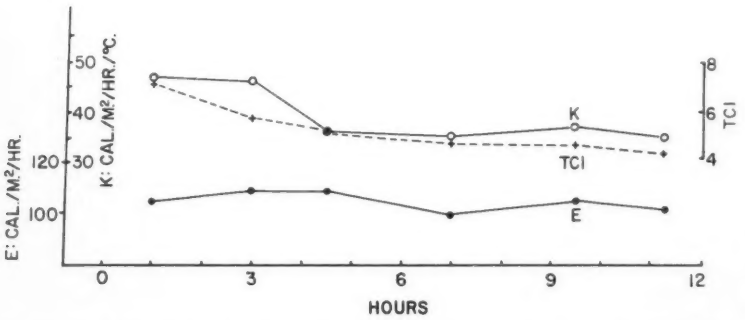

Figure 6. Changes in conductance (K), thermal circulatory index (TCI), and evaporative heat loss (E) in subject 8 during continuous exposure to 43.3°C combined with progressive dehydration.

Cutaneous vascular data

Conductances were calculated from the weight loss and from ambient and body temperatures. (Metabolic rate was assumed to remain constant. The environmental constant of the chamber was 7 kg cal/m²/hr/°C). With the exception of 3 experiments, conductances either decreased slightly or remained constant. The significance of the changes was uncertain. In all instances, the values indicated a continued vasodilatation in the skin. An illustration of the sequence of the values in an individual experiment is provided in figure 6.

A thermal circulatory index [21] was calculated by assuming constancy of the evaporative rates and of heat production. The means and deviations of these estimates on the group of subjects have been entered in figure 7. After the third hour of exposure, the indexes seemed to stabilize until the seventh hour, when they began to fall. At this time, dehydration amounted to about 3.5 percent of the body weight.

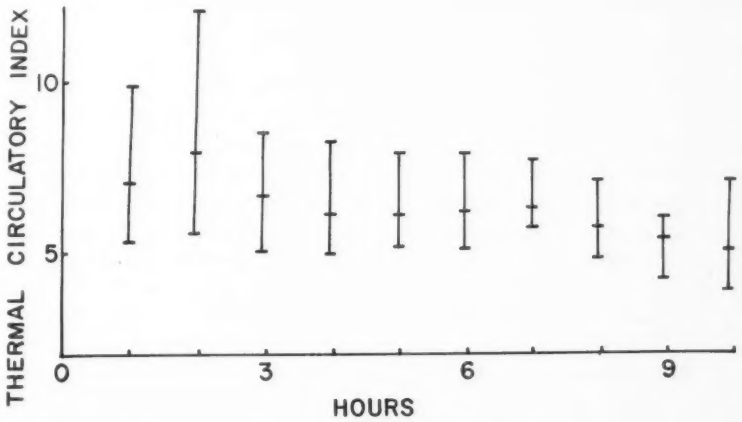

Figure 7. Changes in the thermal circulatory index during progressive dehydration plus exposure to 43.3°C in 8 subjects. Middle bars indicate means for the group. Vertical bars indicate range of values for the group.

The amplitudes of the volume pulses in the pads of the fingers and toes did not show any consistent trends (fig. 8). Comparisons between conductances and the digital pulses were not considered in this study since other unreported work in this laboratory demonstrated no consistent relation between vasodilatation in the digits and that in other skin areas during heat exposures.

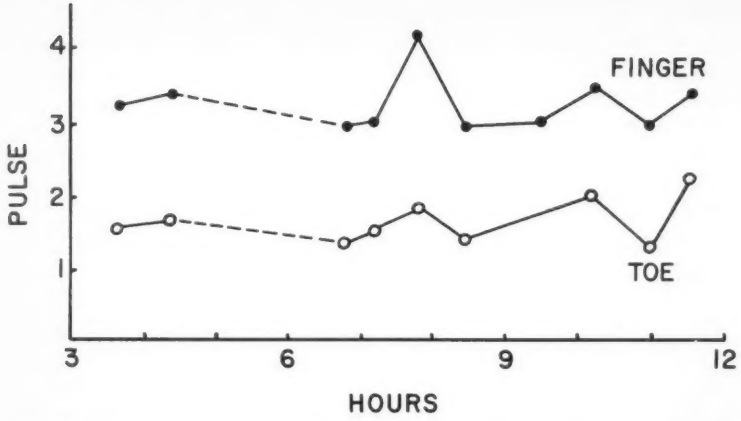

Figure 8. Amplitudes of pad pulses in finger and toe during continuous exposure to 43.3°C plus progressive dehydration. Skin pulses were recorded by photoelectric photometer. Amplitude of pulse: percent of photoelectric current. Breaks in recordings indicated by dashed lines. Subject 1.

Other circulatory data

Heart rates increased about 28 beats per minute with each degree rise in oral temperature. The slope of this relation was remarkably uniform in the different subjects. There were no appreciable changes in brachial systolic and diastolic blood pressures of the subjects while in the semireclining position. However, symptoms that could be attributed to postural hypotension during weighing periods when the subject stood erect became increasingly apparent as the exposures continued. The numerical value of the flicker fusion frequency did not change appreciably as dehydration progressed. Urine outputs decreased in all subjects but the amount varied in different subjects. In those subjects from whom blood samples were taken the blood became more alkaline. One subject exhibited tetany from hyperventilation, but sweating was unimpaired.

DISCUSSION

Two significant observations stand out in the present series of experiments: First, after the period of initial thermal equilibration of the subject with the hot climate of the chamber, his body temperatures rose progressively as he dehydrated (fig. 2). Such an increase in his temperatures did not occur when he was exposed for 32 hours to an

equally hot climate if his hydration was maintained (table 1). Second, the increased body temperatures of the dehydrating subject did not elicit a greater sweat output (figs. 2 and 3). In contrast to this lack of sweating response to a rise in body temperature, total sweat output of the normally hydrated subject increased by 300 gm per square meter per hour when oral temperature rose 1.0°C.[20]

It is theoretically possible to account for the rise in body temperatures during the progressive dehydration by a slight deficit in evaporative heat loss. The following calculations illustrate: In the experiment depicted in figure 3, the deficit in evaporation during the 7 hours between the fifth and twelfth hours would have accumulated at the rate of about 10 gm/m²/hr. At the same time, the accumulated decrease in radiative and convective heat losses due to the rise in skin temperature would have been 14 kg cal/m². Storage heat was considered equal to the difference between the accumulated decrease in radiative and convective heat transfer and the accumulated deficit in evaporative heat transfer or 28 kg cal/m². Assuming the water equivalent of the body to be 32 kg/m², the calculated rise in body temperature would have been 0.87°C. The actual increase approximated this. These calculations assumed no essential change in the metabolic rate. Whether or not the agreement was fortuitous, such estimates indicate the need for precise calorimetry in order to determine the quantitative relation of evaporative heat loss to the rise in body temperature during a combination of dehydration and heat exposure. That sweating deficits are the major factor is indicated by the return of an elevated rectal temperature to normal when the dehydrated subject was brought back to a comfortable environment after exposure to heat.[5] In these illustrative calculations, no distinction was made between cutaneous and respiratory routes of evaporation. When the respiratory water loss was calculated and allowance was made for an increasing movement of air in and out of the respiratory tract, the apparent deficit in sweating was increased.

The failure of the dehydrating subject to respond to the rise in his body temperatures with an increased sweat output suggested the desirability of a quantitative test of the "reactivity" of the sweating mechanism. An attempt was made to design such a test. Precisely reproducible cycles in chamber temperature were imposed on the subject, whose weight losses and regional sweating rates were measured before, during, and after each cycle. Although sweating increased with the additional thermal load, the increments were not consistently uniform in successive trials separated by as much as 1 hour. It became obvious that this procedure posed problems, the solution of which would have to precede its application to the dehydrated subject.

The tendency of sweating to decrease on the lower extremity as dehydration developed was noted in several experiments. If this regional sweating is set principally by the need for thermal regulation, its reduction during progressive dehydration might imply a decrease either in the excitation of or in the "reactivity" of the sweating "center." No decision on this point appears to be available.

One is tempted to assign to the rising osmotic pressures a specific inhibitory influence on sweat output. This might exert its effects on the "reactivity" of the central sudomotor mechanisms or on the sweat glands themselves. In the presence of dehydration they do less osmotic work to elaborate the same quantity of sweat.[9] But it is not clear whether or not the output of sweat per sudomotor impulse is reduced by dehydration. This information would be decisive. The studies with Mecholyl[8] do not clarify the question.

Interpretation of our observations was complicated by the simultaneous occurrence of hyperventilation, which was particularly obvious in the later hours of the exposure but which varied much among the subjects. When effort was directed to diverting the attention of the subject from his distress, ventilation tended to approximate normal levels, as did the blood pH. A rise in body temperature will increase alveolar ventilation and lower alveolar carbon dioxide tension.[22] Certain consequences pertinent to our studies may flow from the resultant shifts in acid-base balance.

First, the decrease in alveolar carbon dioxide tension due to hyperventilation may have prevented further cutaneous vasodilatation as skin temperature rose. Various observations indicate a vasodilating influence of carbon dioxide on the cutaneous circulation. Thus, administration of a mixture of oxygen and carbon dioxide to patients during therapeutic hyperpyrexia improved the blood color of the skin.[23] World War II studies of atmospheres in German submarines showed a rise in skin temperature when the carbon dioxide content of the submarine's atmosphere rose.[24] The rise in skin temperature during sleep may be due to the increase in alveolar carbon dioxide tension.[25] This gas increased blood flow in the skin [26] and the oxygen saturation of the blood in a superficial forearm vein.[27] The opposite happened during hyperventilation,[28] which also elicited an increase in cutaneous venomotor tone.[29] Although the influence of a developing hypocapnia on the cutaneous circulation was not examined in our experiments, it may have accounted for the tendency of the conductances and thermal circulatory indexes to fall slightly late in the exposures. The absence of a corresponding vasoconstriction in the palm and sole may be referred to the dominant control of the vasoconstrictor innervation over these vessels. Related information has been summarized in a

recent review of the vasomotor control of the cutaneous circulation.[30]

Second, the possibility that hypoxia of the brain resulting from hyperventilation [31] caused deterioration in the precision of temperature regulation deserves consideration. In man, hypoxia reduced the effectiveness of regulation against cold.[32] In the dog, hypoxia exerted a variable influence on the course of a fever induced by breathing a warmed, humidified atmosphere.[33] Patients in congestive heart failure and presumably in hypoxia exhibited anxiety, dyspnea, fever, and a marked reduction in sweating on the forearm and calf.[34] The effects of variations in alveolar ventilation on the cerebral arteriovenous oxygen difference are maximal when arterial carbon dioxide tensions deviate from the normal operating point of 40 mm Hg.[35] It seems possible, therefore, that unrecognized hyperventilation during exposure to heat with dehydration may depress the temperature-regulating centers by hypocapnia and hypoxia. Whether or not the failure of the flicker fusion frequency to reveal such cerebral changes is to be considered as contradictory evidence must remain an open question.

CONCLUSIONS

The evaporation of water on the body's surface is the only mechanism available for the transfer of metabolic heat to the environment when the latter is hotter than the subject. A slight deficit in evaporation must result in a corresponding storage of heat. Circulatory changes may follow this event and may influence the distribution of heat in the body and the extent of thermal heterogeneity; but they cannot prevent heat storage under these circumstances. We are inclined, therefore, to discount peripheral circulatory failure as directly responsible for the rising body temperatures in a dehydrating subject exposed to a hot climate, particularly in our experiments in which the indexes of cutaneous blood flows suggested levels that were several times greater than in the comfortable subject.

A small deficit in the sweating of the dehydrating subject was suggested in calculations of the thermal exchanges. Although the accuracy of these estimates may be doubted, the failure of sweating to increase as body temperatures rose demonstrated a diminishing "reactivity" of the sweating mechanism to the thermal stimuli. This change would necessitate progressively higher body temperatures for the maintenance of the sweat output. The mechanism of the diminishing "reactivity" is not clear.

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SUMMARY

If normal resting subjects were kept hydrated, they maintained their total and regional sweating rates without evidence of "fatigue" of sweating and without a rise in body temperatures during a continuous exposure for 32 hours to 43.3°C.

Dehydrating subjects lost weight at the rate of 0.5 percent per hour of exposure in the same conditions; their body temperatures rose 0.1°C per hour, but total evaporative heat loss changed very little despite the increase in body temperatures. Calculations indicated that the rise in the latter was due to a slightly inadequate sweating, which in turn was attributed to a rising thermal threshold for sweating.

Regional sweating rates, particularly on the head and upper parts of the body, varied widely during the exposure of the dehydrating subjects. Rates on the lower extremity tended to fall as the exposure continued.

Cutaneous conductances, thermal circulatory indices, and the pad pulses in the finger and toe changed very little. There was no evidence of peripheral circulatory failure in these experiments. Its direct influence in accounting for heat storage was discounted.

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REWARD FOR ILLNESS

Iatrogenic heart disease has become popular. There is grave doubt, however, that, in the emotionally mature patient, the casual remark or overt comments concerning laboratory procedures and the like would produce a cardiac neurosis. It seems rather that the development of a cardiac neurosis or an individual's fixation upon his heart occurs only in those people who are emotionally immature. The iatrogenic phase of their illness represents the trigger mechanism that establishes the disability. It is also possible by virtue of emotional immaturity for a person with either a functional or organic lesion to refuse rehabilitation because the reward he receives from his illness is such that he cannot afford to be cured. It is suggested that this complication be entitled "remunerative heart disease." These patients are well known to all, but the problems they create have received little emphasis in cardiology. Once a patient receives a great reward either psychologically or financially from his illness, he is difficult to rehabilitate.—John F. Briggs and James Bellomo: Remunerative Heart Disease. *The Journal-Lancet*, February 1959.

Incorporation of Radiopaque Materials Into Denture Plastics

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TRAUMATIC FACIAL INJURIES of persons wearing partial and complete acrylic dentures are sometimes complicated further by fragmentation of these dentures. Acrylic resin is not radiopaque, and these fragments are potentially dangerous if they are lodged in the soft tissues of the body. This problem has been pointed out by Collon,[1] who has seen numerous accident cases in which the patient's dentures were broken and fragments were not accounted for after the accident. In some cases the fragments not demonstrated by roentgenograms were found to be lodged in soft tissues.

Recognition of these fragments would have been possible if a radiopaque substance had been incorporated into the denture base material. Such a substance must meet certain specifications: (1) it must be nontoxic; (2) it must be incorporated in sufficient quantity to produce radiopacity of the acrylic resin; (3) it must not adversely affect the physical properties of the acrylic resin; (4) it must not change the color or cause the color to be unstable.

We have not been able to find any written information regarding the incorporation of radiopaque materials into denture bases. According to Vernon,[2] some attempt was made in Great Britain during the second world war to render Perspex opaque to roentgen rays, but the results were not published. In this country, investigation of the problem of making radiopaque resin materials has demonstrated that many heavy minerals that are white in color function very well for this purpose, but in denture bases the concentration required for radiopacity is so high that esthetic qualities are lost.[3]

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The purpose of this study was to incorporate several materials into acrylic resin to determine their compatibility, radiopacity, and color characteristics and stability.

MATERIALS AND METHODS

The following liquid and powdered radiopaque materials were selected for this study: silver alloy, lead acetate, finely ground gold, gold leaf, magnesium oxide, bismuth subcarbonate, barium sulfate, Hypaque, 70 percent Diodrast, Micropaque, 35 percent Diodrast, Hypaque sodium, Hypaque-M, and barium fluoride.

For the processing of resin materials, denture flasks of the ejector type were used. Into each of these flasks, 4 sections of wax 12 mm in length, 3 mm in width, and 3 mm in thickness were imbedded in stone. After the stone set, the flasks were separated and the wax

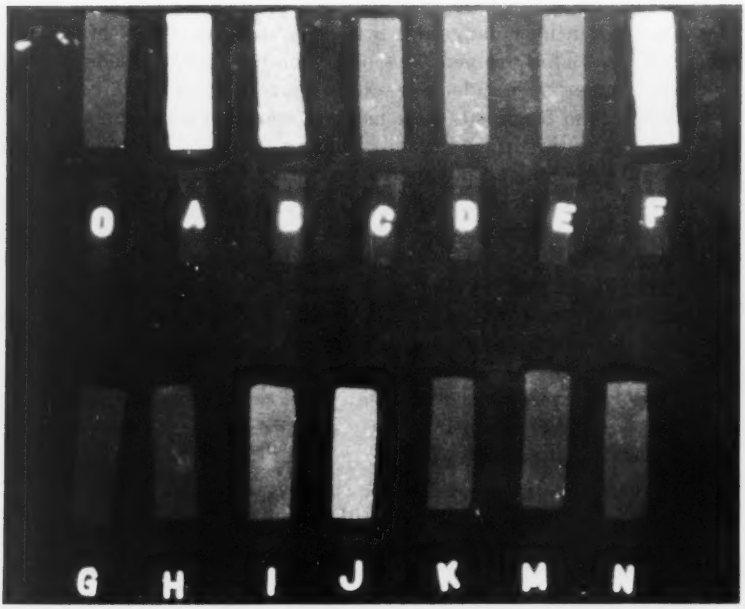

Figure 1. Roentgenogram of acrylic resin blocks containing various radiopaque materials. O, control; A, silver alloy; B, lead acetate; C, finely ground gold; D, gold leaf; E, magnesium oxide; F, bismuth subcarbonate; G, barium sulfate; H, Hypaque; I, 70% Diodrast; J, Micropaque; K, 35% Diodrast; M, Hypaque-M; N, barium fluoride.

Table 1. ***Effect of various radiopaque materials on acrylic resin blocks***

Material	*Compatibility*	*Radiopacity*	*Discoloration*
Silver alloy	+	++++	Dark gray
Lead acetate	+	+++	Lighter color with whitish flakes
Gold (finely ground)	+	−	Brownish
Gold leaf	+	+	Gold flecks
Magnesium oxide	+	−	Lighter
Bismuth subcarbonate	granular	++	Milky white
Barium sulfate	+	−	Lighter
Hypaque	−	−	Lighter
Diodrast 70%	−	−	Lighter
Micropaque	granular	+	Whitish
Diodrast 35%	−	−	No change
Hypaque sodium	−	−	Mottled
Hypaque-M	−	−	Lighter
Barium fluoride	+	+ Increases with increase in concentration	No color change until about 28.5%

+ = Compatibility, radiopaque — = Noncompatible, radiolucent

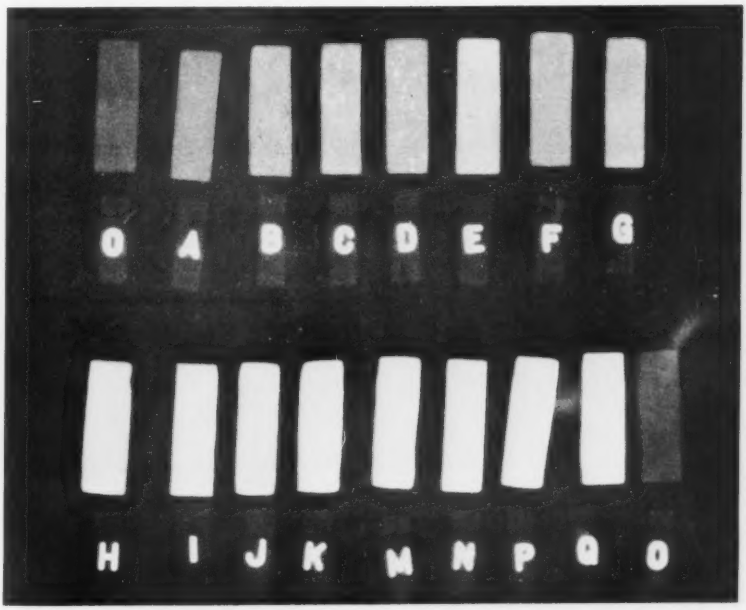

Figure 2. Acrylic resin blocks containing increasing amounts of barium fluoride. O, control; A, 1.9% barium fluoride; B, 3.8%; H, 16.6%; K, 26.4%; Q, 50% barium fluoride.

was removed with boiling water. A layer of 0.001 tinfoil was then burnished into each of the 4 sections. Tinfoil was also used to cover the top half of the flask to act as a separating medium.

Each radiopaque material was then mixed in varying proportions with the acrylic resin powder. In each instance the ratio of polymer to monomer was 2.5 grams to 1 ml. After curing, using accepted procedures, these blocks were polished and examined for compatibility, radiopacity, and color change.

RESULTS

The acrylic resin blocks containing various radiopaque materials were placed on 8- by 10-inch radiographic film and exposed for 1½ seconds (fig. 1). Of the materials selected for study, Hypaque sodium could not be tested satisfactorily because of crumbling of resin blocks incorporating this agent. It will be noted that silver alloy (A), lead

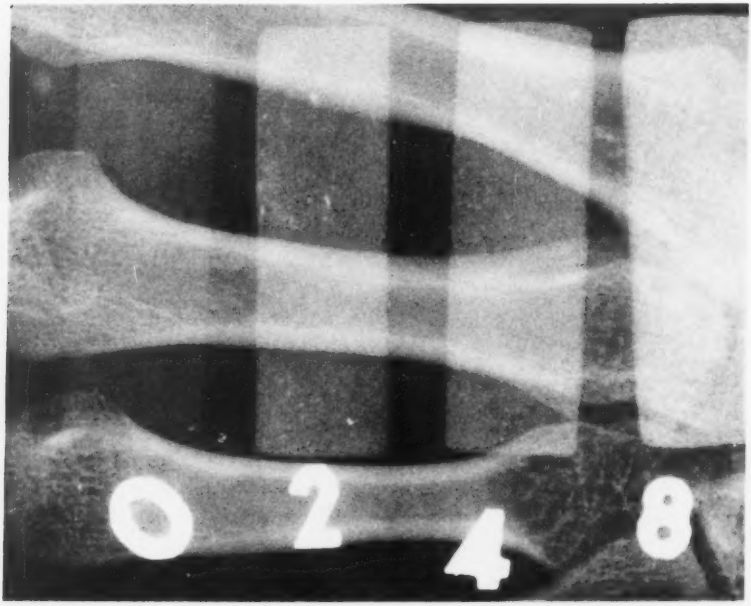

Figure 3. Roentgenogram of acrylic resin blocks containing various concentrations of barium fluoride, placed under a hand. O, control. Blocks 2, 4, and 8 contain 7.4%, 13.8%, and 24% barium fluoride, respectively.

acetate (B), gold leaf (D), bismuth subcarbonate (F), and Micropaque (J) all produced an increase in radiopacity compared with the control (O).

The block containing silver alloy was dark gray; the lead acetate block was a lighter color than normal pink acrylic, with white flecks dispersed throughout. The block containing finely ground gold was

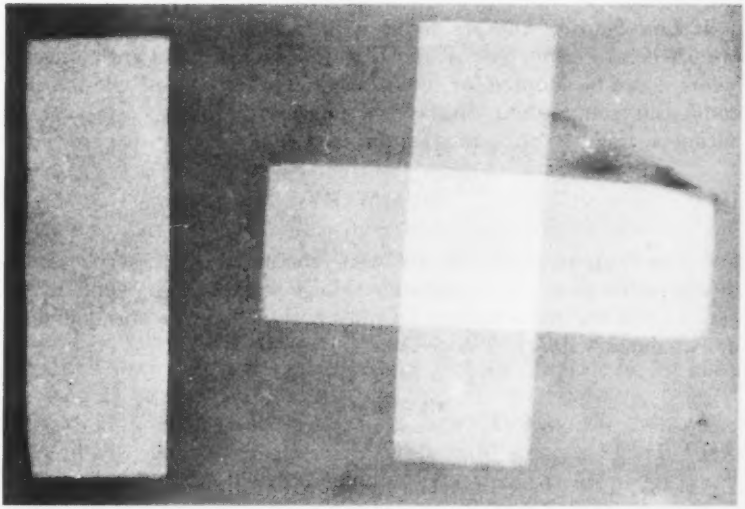

Figure 4. Roentgenogram of resin blocks containing barium fluoride. Each block is 3 mm thick. The single block on the left contains 17% barium fluoride. One of the crossed blocks contains 7%, the other 10% barium fluoride; the overlapping area, 6 mm in total thickness and containing a total concentration of 17% barium fluoride, is more radiopaque than the single block.

a brownish color. Most of the other materials tested produced a lighter color than normal. The block containing 35 percent Diodrast revealed no color change, and the block with barium fluoride did not show a color change until 28 percent of the material was incorporated in the acrylic resin. An evaluation of all materials tested is shown in table 1.

Barium fluoride caused a notable radiopacity when the concentration was approximately 1.9 percent. As the concentration of barium fluoride was increased, the radiopacity increased (fig. 2). An increase in radiopacity with an increase in barium fluoride concentration was also noted when a roentgenogram was made of a control acrylic

resin block together with blocks containing various concentrations of barium fluoride placed under the hand (fig. 3). The radiopacity of the blocks varied with the thickness of the block as well as with the concentration of barium fluoride (fig. 4).

Little color change was noted when the acrylic blocks contained up to 29 percent barium fluoride. Although there was some color change at very high concentrations, the 50 percent concentration is still suitable.

Barium fluoride appears to be a promising radiopaque material to incorporate into acrylic resin; however, further tests are indicated before it can be adopted for clinical use. These must include toxicity and tissue compatibility tests; and physical property tests such as hardness, fragility, shrinkage, absorption, and stability.

SUMMARY

Fourteen radiopaque materials were combined with acrylic resin to determine their effects on color change, compatibility, and radiopacity. Of the materials tested only barium fluoride was found to be satisfactory in all 3 criteria.

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THE AROMA OF CIVILIZATION

What's in the air? Plenty, if you read the papers and watch the skies. In urban areas, smog and other forms of air contamination are a growing menace to national health. Throughout the United States studies show a growing discharge of solids and gases into the air we breathe . . . Remedies already applied have only scratched the surface and pure air may soon cost our citizens as much as pure water. With air pollution and cigarette smoking both possible causes of cancer, the public is understandably confused. Whether to stop smoking or stop breathing leaves little alternative. In the meantime we can only hope that the aroma of civilization will improve.—Robert B. Martin: What's in the Air? *Journal of the Medical Society of New Jersey*, October 1959.

Dioctyl Sodium Sulfosuccinate in the Control of Constipation

A Study in Submariners During Prolonged Cruise

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ALTHOUGH THE CONTROL OF CONSTIPATION during protracted submerged cruises is not an extremely serious medical problem, it is nevertheless important for the health of the crew. It is anticipated that with the increasing duration of submerged periods (e.g., U.S.S. *Seawolf*, 60-day submergence, Aug.–Oct. 1958), the control of constipation may become a more serious problem, especially for those persons prone to "poor" bowel tone.

Data obtained from submerged cruises of the *Nautilus* and *Seawolf* suggest the relative infrequency of constipation reported by the crew. For example, during the 1956 *Nautilus* habitability cruise of 265 hours, 1 man out of a representative sample of 36 reported constipation to be a serious problem for him.[1] Similarly, in a sample of 52 of the crew of the *Seawolf*, only 1 man reported being constipated during a 14-day completely submerged cruise in 1956.[2] Although not necessarily symptomatic of constipation, data regarding frequency of bowel movements during the 2 cruises mentioned above, as well as the recent *Nautilus* subpolar submergence, indicate quite clearly a trend toward progressively less frequent defecation as the submerged period progresses.

A search of the literature indicated that at the time of this study, differential treatment of constipation aboard submarines had not been studied systematically. The rationale for the experimental use of Colace (dioctyl sodium sulfosuccinate) rather than laxatives or cathartic drugs stems from the different pharmacologic action of the 2 classes of medication. Colace contains no agents that produce peristaltic stimuli. Rather, through a physical mechanism, the com-

From Medical Research Laboratory, U.S. Naval Submarine Base, New London, Conn. Report No. 305.

pound acts as a wetting agent by lowering the surface tension of the water in the alimentary canal, increasing its wetting efficiency and promoting the formation of oil-water emulsions. It appears to allow water and fatty material to penetrate the stool and become more thoroughly mixed with the feces, resulting in a softer and more homogeneously formed stool of normal bulk.

A study was designed to compare changes in bowel habits and stool characteristics of a random sample of men treated daily for 14 days with Colace, as compared with those given a placebo and with an untreated control group. The study was performed on the U.S.S. *Tench* during a snorkel cruise to the Mediterranean from New London, Conn. It should be noted at this point that in light of the number of variables known to affect bowel function, the results of this study must be interpreted cautiously. The extrapolation of these results to populations other than submariners under submerged conditions would be tenuous at best.

SUBJECTS AND METHODS

Fifty-nine men from the crew of the U.S.S. *Tench* volunteered for this experiment. Their average age was approximately 21. Twenty-two men each were assigned at random to the Colace and placebo groups. One subject in the Colace group failed to return his rating booklet and had to be dropped from the study. Fifteen men were assigned to the control group, which received no treatment. Since men with different rates and ranks have different work assignments (presumably involving unequal amounts of exercise) aboard the submarine, it was hoped that the randomization technic had avoided bias in any of the 3 groups. Table 1 shows the breakdown by rank and rate for the 3 groups.

A statistical test of the significance of the differences between the rate and rank composition of the 3 groups indicates that the discrepancies observed in table 1 are not large enough to introduce any serious bias into the experiment. (With 6 degrees of freedom, P of $X^2 > 30\%$.)

The hospitalman aboard the submarine was provided with detailed instructions for administration of the medication by the squadron medical officer. Accordingly, the subjects were told that some of them would be given a package of capsules, 1 capsule to be taken each 24 hours, after breakfast or after the first full meal following a regular period of sleep (for those on the midwatch). The Colace and placebo capsules were identical in color and shape. Each Colace

Table 1. ***Breakdown of Colace, placebo, and control groups by rate and rank***

Rate or rank	*Colace*		*Placebo*		*Control*		*Total*	
	f	*% of group*	*f*	*% of group*	*f*	*% of group*	*f*	*% of total*
Officer	1	4.8	2	9.1	1	6.7	4	6.9
Nondesignated striker	2	9.5	1	4.5	2	13.3	5	8.6
CS	1	4.8	2	9.1	0	0	3	5.2
EM	7	33.3	3	13.6	1	6.7	11	18.9
EN	5	23.8	3	13.6	3	20.0	11	18.9
ET, ETR, ETS	1	4.8	2	9.1	1	6.7	4	6.9
FT, HM	0	0	1	4.5	1	6.7	2	3.4
IC	1	4.8	1	4.5	1	6.7	3	5.2
MM, RM	2	9.5	3	13.6	0	0	5	8.6
QM, QMQ	1	4.8	1	4.5	1	6.7	3	5.2
TM, TMT	0	0	2	9.1	3	20.0	5	8.6
SO, YN	0	0	1	4.5	1	6.7	2	3.4
Totals	21	100	22	100	15	100	58	100

capsule contained 100 mg of dioctyl sodium sulfosuccinate. Fourteen capsules, the amount needed for the 14-day experiment, were placed in identical packages for distribution. The hospitalman who distributed the medication knew only the number identification of the packages, not the contents.

Daily self-ratings were made regarding frequency of bowel movement, difficulty and pain associated with passing of stools, relative firmness of stools, and any indication of abdominal distress. In addition, a close check was made daily on any other medication taken, such as APC or aspirin, as well as on gross reports of the amount of fluid and food intake and frequency of urination.

The use of an experimental design involving successive measurement of the same subjects necessitates statistical technics that take into account the effects of correlation between the daily measurement sessions. Consequently, an analysis of variance technic designed for this purpose was employed.[3] By means of this method a stringent statistical test of the differential responses of the Colace, placebo, and control groups to each of the items contained in the questionnaire was provided. For each question considered on the daily self ratings, the analysis examined the reliability of the differences for several hypotheses: between groups; between subjects; between days; and the interaction of groups and days (the most crucial hypothesis). The results were considered "highly" or "very significant" when rejection of the chance hypothesis was at the 1% confidence level, "significant" at $<5\%$ $>1\%$; and "nonsignificant" at $>5\%$.

RESULTS

Several preliminary findings relating to the control of relevant variables should be presented in order to evaluate the daily self ratings more comprehensively. The question of whether any of the groups was biased in the direction of containing disproportionately more (or fewer) subjects with chronic constipation was examined. Assuming these self reports to be reliable, it appears that approximately 25 percent of both the Colace and placebo groups reported constipation to be a problem. However, none of the control group reported this problem. A statistical check showed no significant differences between the Colace and placebo groups; however, it cannot be denied that the control group differed from the other 2 groups in this regard. If this is a bias, however, it is in the direction of attenuating any differences between the 2 treated groups and the control, since the Colace and placebo groups both contained more subjects with constipation problems.

On the other hand, the 3 groups were approximately equated in terms of usual stool characteristics. Likewise, the 3 groups did not differ significantly in terms of their habitual use of laxatives. It should also be noted that the reported frequency of bowel movements ashore was equated for all 3 groups (mean number 7 movements per week). At sea, the Colace group reported 5.2, the placebo group 4.9, and the control group 5.6 defecations on the average per week. There is no significant difference among the 3 groups in frequency either at sea or on shore; however, all 3 groups report significantly less frequent bowel movements at sea as compared with the number on shore.

Finally, since certain common medications, especially those containing opium derivatives, are known to affect peristaltic action of the bowel, a record of daily medications was also obtained from each of the 58 subjects. On any 1 day, grossly 85, 81, and 93 percent of the Colace, placebo, and control groups, in that order, took no medication other than the experimental treatment. Other medication taken by the subjects consisted of the following: Standard Navy cough medicine was taken by 1 man in the control group daily for the first 6 days and by 1 man in the placebo group daily for the duration of the cruise. APC's (2 or 3 pills) were taken by 1 member of the Colace group on 3 separate days, by 2 men on 4 days, and by 4 men 1 day only. One man from the placebo group consumed APC's (2 pills) on 4 days, 2 men on 2 days, and 3 men on 3 separate days. One man from the control group took APC's on 1 day and 2 men took APC's on another day. Miscellaneous medication con-

sisted of vitamins (unspecified) taken daily by 1 man in the Colace group, and antibiotics (again unspecified) taken by 1 to 3 men in the placebo group on every day of the cruise. Because of the sparsity of the data, statistical check of the differences among the 3 groups was possible only for APC medication. This check showed no reliable differences among the groups in terms of APC consumption.

Bowel Habits

The question of the frequency of bowel movements was examined first. Variance analysis of the data indicates that the 3 groups differed very significantly in frequency of bowel movement from day to day during the cruise ($P<.01$ for the crucial F-ratio of groups-days interaction). The direction of the group differences was evaluated by comparing mean ratings from day to day for the 15-day cruise.

In the first place, the largest differences appeared on the ratings for the fifth day after the onset of the experiment. This finding would seem to be consistent with the probable rate of action of Colace. The mean number of bowel movements of the Colace group exceeded the mean of the placebo group on 11 of the 15 days and exceeded the control group mean on 9 of the 15 days. On the other hand, the placebo group exceeded the control group on only 6 of the 15 days.

However, if we remove the 4 subjects from the Colace group and the 5 subjects from the placebo group who reported themselves characteristically constipated, the mean ratings of the Colace group now exceed the placebo group on 12 of the 15 days and exceed the control group on 9 of the 15 days. The placebo group mean ratings exceed the control group mean ratings on 6 days. Although statistics involving as few as 4 or 5 subjects are admittedly unreliable, it should be pointed out that within the group of men reporting constipation a problem (5 placebo and 4 Colace), the placebo exceeded the Colace means 10 of the 15 days.

In short, the data on frequency of bowel movements argue that Colace increases frequency in persons who report no constipation problem but probably has no effect on persons with chronic constipation. As a result of this finding, it was believed that the remaining analyses should be done for the groups with constipation problems apart from those without such symptoms. (This process of fractionating the data, of course, reduces the sample size of the placebo group from 22 to 17. The Colace group was reduced from 21 to 15, 2 subjects having been deleted because of incomplete daily ratings.)

The data related to fecal consistency indicate that the group differences were significant throughout the cruise and, in particular, the day-to-day group differences were highly significant with respect to this variable.

A comparison of the group means by day indicates the direction of the differences as follows: The Colace group (with constipated subjects deleted) reported their feces to be less firm than the placebo group on 13 of the 15 days, and less firm than the control group on 14 of the 15 days. However, interestingly enough, the placebo group also reported less firm stools than the control group on 14 days of the cruise. On the other hand, the "constipated" group taking Colace reported stools as firmer than the placebo group on 10 of the 15 days of the cruise. The tentative conclusion to be drawn from these data is that both "treated" groups reported less firm stools (suggesting psychologic effects of treatment). However, the fact that the Colace group reported less firm stools than the placebo on all but 2 days of the cruise increases the probability that the Colace medication actually affected fecal consistency.

The results of the analysis of the data relevant to reported "difficulty" encountered in defecation indicate group differences small enough to be accounted for by chance.

In the analysis of responses to the question related to the severity of pain experienced during defecation, mean group ratings over all 15 days did not differ significantly. However, the group ratings did vary very significantly from day to day. The day-to-day differences (with 9 constipated subjects deleted) indicate that the Colace group reported more pain than the placebo group on 14 of the 15 days and more than the control group on 10 days. On the other hand, the placebo group reported less pain than the control group on 11 days of the cruise. The Colace group, chronically constipated, reported less pain than the placebo group on 11 days of the cruise. In short, the group treated with Colace tended to report more pain associated with defecation than the other groups. In the absence of additional information as to the nature of the pain being reported on the rating sheets, the most plausible explanation of this finding is that the men in the Colace group were reporting rectal irritation resulting from more frequent defecation during the cruise.

The possibility that the treated groups reported more abdominal discomfort during the cruise was analyzed. The data indicate that the 58 subjects as a whole did not differ in reported pain from day to day but that the groups varied very significantly ($P<.001$) from one another as the cruise progressed. The direction of the daily group differences (with chronic constipated subjects deleted) indi-

cates that the Colace group reported more severe abdominal pain than the placebo group on all but 1 day of the cruise and, likewise, more pain that the control group on 14 days. On the other hand, the placebo group reported more pain than the control on only 4 days of the experimental period. In contrast to lack of consistency between the "constipated" group and the nonconstipated group in terms of their responses to the item analyzed above, the constipated Colace group also reported more abdominal discomfort than the constipated placebo group on all but 2 days of the cruise. The tentative conclusion that can be drawn from this analysis is that both the chronically constipated group and the nonconstipated group treated with Colace reported more abdominal discomfort than the other 2 groups. It is difficult to explain this apparent increase in abdominal pain. However, these symptoms may be related to gaseous distension, which may occur when defecation is voluntarily deferred under conditions of submarine operations.

Food and Fluid Intake, Frequency of Urination, and Exercise

The daily self rating provided a gross check on fluid intake during the cruise. The results of the variance analysis indicate that there was no significant over-all group difference during the cruise but that from day to day the pattern of differences varied very significantly. The direction of the differences is indicated by the following facts concerning the mean differences (chronically constipated group deleted). The Colace group reported a higher fluid intake than the placebo group on 9 days and higher than the control group on 8 days. The placebo group exceeded the control group on 6 days. Of interest is the fact that the 4 chronically constipated persons taking Colace reported much greater fluid intake on every day of the cruise than the 5 "constipated" men taking the placebo. The most obvious implication of these findings is that there is a slight tendency for the larger (nonconstipated) Colace group to drink more fluid, but the "chronics," taking Colace, probably drink considerably more than normal quantity of fluid. One possible explanation of these findings is that as the surface tension of the alimentary water is lowered by Colace, oil and water permeate the stool, and, as a result, additional water is needed to maintain equilibrium. In the case of the chronically constipated group, much more water would be needed to permeate and soften the stool, thus inducing a greater fluid intake.

As in the case of fluid intake, analysis of the data on renal function, as indicated by reported frequency of urination, reveals that there

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were no group differences when considering the mean statistics taken over the 15 days, but that patterns of group differences varied very significantly from day to day throughout the cruise.

Again eliminating the chronically constipated subjects, trends in the data are indicated by the fact that the Colace group reported more frequent urination than both the placebo group and the control group on every day of the cruise. The placebo group, on the other hand, reported more frequent urination on only 8 days of the cruise. In addition, the chronically constipated Colace group also reported greater frequency of urination than the placebo group on every day of the cruise. Notwithstanding the inability to equate reports of frequency of urination with urinary output, the data still argue that both constipated and nonconstipated submariners treated with Colace tend to report more frequent urination. In view of the finding that the total Colace group reported greater fluid intake than the placebo or control groups, it seems only natural that the increase in frequency of urination would be commensurate with the increase in fluid intake.

Although of questionable relevance to this experiment, food intake was recorded daily by each subject. Analysis of the data indicates that the groups differed very significantly in their eating habits from day to day. In general, the direction of the differences is indicated by the fact that the Colace group reported eating less than the placebo group on 8 days, as much as the placebo group on 3 days, and more than the placebo group on 4 days. The Colace group reported eating less than the control group on 6 days, more on 6 days, and as much on the remaining 3 days. The constipated Colace group reported eating more than the constipated placebo group on 11 of the 14 days for which data were available. With the exception of the data pertaining to the "constipated" subjects, the results would suggest that food intake was fairly well equated for the 3 groups throughout the experimental period.

Finally, group differences with respect to the amount of exercise engaged in during the cruise were obtained. Unfortunately, the day-to-day group differences varied very significantly ($P < .001$). The nature of the group differences is indicated by the fact that the Colace group (constipated subjects eliminated, of course) reported less exercise than the placebo group on 10 days and less than the control group on 9 days. The placebo group also reported less exercise than the control group on 9 days. The Colace "constipated" group reported more exercise than the placebo group on 7 days. If anything, these data suggest that subjects in the Colace group were

characteristically engaging in less exercise than either of the other 2 groups.

DISCUSSION

For any meaningful discussion and interpretation of the results of this study, it is necessary to point out at least 2 limitations inherent in the design of the experiment. In the first place, the effects of treatment were inferred from personal reports, which, at best, are fraught with error from individual bias and nonspecificity, with consequent unreliability of the rating scales themselves. A second limitation (actually included in the first) is the absence of definable criteria with respect to which a person may make his ratings. An example of this limitation may be found in data on frequency of defecation. Two people may report having 2 bowel movements on a given day; yet, in terms of the copiousness of their stools, they may have differed radically. The same limitation applies to all the items in the daily self rating.

It is believed, however, that the particular method of data analysis attenuated considerably the seriousness of these limitations. Although an exposition on statistical methodology would be necessary to prove this, the analytic method provided a precise technic for calculating the inherent experimental error. Moreover, significance of group differences was always examined as a ratio of difference to error. In effect, then, the greater the experimental error, the less likely a false finding would be reported as true.

Notwithstanding these limitations, the results of this study seem rather clear. One important finding appeared early in the study, namely, that the day-to-day group differences showed dissimilar trends for those few subjects who reported constipation to be a problem, as compared with the majority who reported minimal or no symptomatology. Consequently, the intergroup comparisons throughout the study were made separately for the "constipated" and "nonconstipated" groups. With the data fractionated in this manner, it seems apparent that dioctyl sodium sulfosuccinate (Colace) has some efficacy in the prevention of constipation by increasing the wetting efficiency of intestinal water, allowing it to permeate the stool, thus keeping it soft. Needless to say, in the chronically constipated groups there are many variables that may affect bowel function. Colace had little, if any, effect upon this group, however, and these data are compatible with data reported by other workers.[4] The rationale for the use of Colace in a submariner population, then, would appear to be in the prevention of constipation and not in its treatment.

SUMMARY

Capsules containing 100 mg of Colace (dioctyl sodium sulfosuccinate) were taken daily by a random group of 21 men for 14 days of a continuous snorkeling cruise aboard the U.S.S. *Tench*. A placebo group (22 men) and a no-treatment control group (15 men) also participated. All subjects kept daily records of frequency and difficulty of bowel movements, firmness of stools, and frequency of urination. Analysis of the results, using a stringent analysis of variance technic, indicated that (1) the Colace group reported more frequent defecation; (2) both the Colace and placebo groups reported less firm stools (suggesting psychologic effects of treatment), although the effects were more remarkable in the Colace group; (3) the Colace group reported more abdominal discomfort, as well as more pain associated with defecation; and (4) the Colace group consumed more fluid and reported more frequent urination than the placebo or control groups. The data also indicated that the 4 Colace-treated subjects who were chronically constipated showed no response to the compound, suggesting that Colace may be useful in the prevention of constipation but not in its treatment.

ACKNOWLEDGMENTS: Appreciation is extended to Captain W. W. Welham, MC, USN, formerly force medical officer, Staff, Commander Submarine Force U.S. Atlantic Fleet, for permission to perform the experiment; to Lieutenant Commander H. B. Thomas, Jr., USN, commanding officer, U.S.S. *Tench*, for permission to utilize volunteers from his crew as experimental subjects; to Lieutenant E. I. Kostohryz, MC, USNR, squadron 2 medical officer, for assistance in organizing the experimental groups; to Hospital Corpsman, first class, T. A. Bergeron, USN, for assistance in the distribution of the medication; and the 58 officers and men of the *Tench* who volunteered as subjects for the study. Thanks are also extended to Mead Johnson & Co., Evansville, Ind., for supplying the pharmaceutic preparations used in this experiment. Finally, appreciation is extended to Florence McGauley and J. A. Auwood for the IBM and computer operations on the data.

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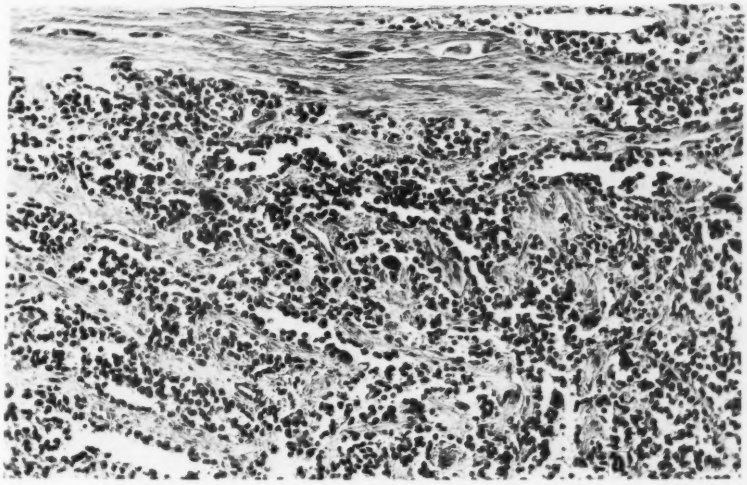
Case for Diagnosis

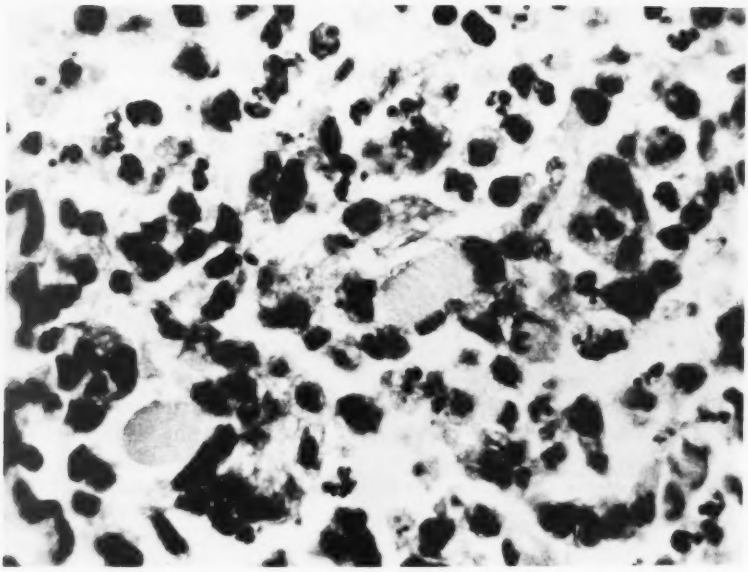
LIEUTENANT COLONEL DONALD J. WINSLOW, MC, USA

A 25-year-old Negro man had noted nonpainful swelling on the ulnar aspect of the right hand for 2 months. There was no history of trauma. At operation a tumor was found invading and replacing the hypothenar muscles.



(Diagnosis? Please turn the page)

From Armed Forces Institute of Pathology. This month's Case for Diagnosis is AFIP Accession No. 915642, contributed by First U.S. Army Medical Laboratory and U.S. Army Hospital, Fort Dix, N.J.



Discussion and Diagnosis

The gross and microscopic picture is characteristic of alveolar rhabdomyosarcoma, a highly malignant tumor that metastasizes widely and usually kills the patient within 1 or 2 years. Giant myoblasts and occasional tumor cells with cross striations are noted.

Reference. Enterline, H. T. and Horn, R. C., Jr.: Alveolar rhabdomyosarcoma; distinctive tumor type. *Am. J. Clin. Path.* 29: 356–366, April 1958.

CASE REPORT

Probably the easiest type of paper to write, and perhaps the one with which the novice should begin, is the simple case report. Not only does it provide interesting reading but it is instructive as well. Although considered by some as a menial form of medical writing, the case report has been used through the ages as an effective literary medium for adding to our medical knowledge.—SELMA DEBAKEY: Some Types of Medical Papers. *Southern Medical Journal*, December 1959.

Armed Forces Institute of Pathology Medical Museum

HELEN R. PURTLE

THE ARMED FORCES INSTITUTE OF PATHOLOGY was established as the Army Medical Museum in 1862, during the Civil War, by Surgeon General William A. Hammond. Believing that the excessive loss of life and limbs from the wounds encountered could be minimized by the creation of a centralized organization devoted to their medical study and research, he directed medical officers to collect and forward to a central agency all surgical and medical specimens, projectiles, and other medicomilitary material that would prove of value to such a study. The collecting agency was established in the Office of The Surgeon General. The Army Medical Museum, as the project was named, became one of the first organized medicomilitary research programs in America.

In August 1862, when Dr. John H. Brinton was appointed first Curator of the Army Medical Museum, the collection consisted of 3 dried and varnished specimens on a little shelf above his desk. To increase it as rapidly as possible, Dr. Brinton assembled a staff, including clerks and medical artists, and visited military hospitals and battlefields in search of material. Five months later, in January 1863, the first published catalog of the Army Medical Museum listed 1,349 specimens. By 1870 the Museum contained several thousand surgical and medical specimens and had achieved recognition both in this country and in Europe.

Today more than 5,000 of the original Civil War specimens remain in the files of the Museum. In addition to this collection, over 700,000 specimens, representing practically all diseases known to man, have been submitted for study and research. From this material, rare and unique specimens have been selected for study and display.

From the Medical Museum of the Armed Forces Institute of Pathology, Washington, D.C.

In 1863 a photographic department was added under the direction of Surgeon Joseph Janvier Woodward. It was here that Woodward contributed so much to the field of medical photography. Probably the first photomicrographs ever produced in this country were made by Woodward while at the Museum. Although only a representative selection of his remarkable work is on permanent display in the Museum, the files contain over 6,000 prints and negatives available for reference and study.

The collection of historic microscopes begun by Dr. John Shaw Billings while he was curator from 1883 to 1893 became the nucleus for the addition of related items of medicohistorical significance. Today, the instrument file includes over 500 historic microscopes and approximately 5,000 medical, surgical, and diagnostic instruments.

Anatomic and embryologic charts, models, specimens, medals and stamps of medical interest, and associated materials have periodically and systematically been added to the museum's collection, both to increase the number of accessions and to offer a wide and interesting variety of medicohistorical material for the information of visitors.

The phenomenal growth of the Museum necessitated 4 successive moves before 1887. The most historic building it occupied was the Ford Theater, where President Abraham Lincoln was shot. The theater, closed immediately after the assassination in 1865, was subsequently remodeled for the use of the Museum and the Army Medical Library. In 1887 a new building was erected on Independence Avenue at Seventh Street SW, in Washington, D.C., which the Museum and Library shared for almost 70 years.

Shortly after World War I the Museum was designated as the Central Laboratory of Pathology of the Army. In 1946 its official name was changed to the Army Institute of Pathology, at which time the strictly museum functions were consolidated into one of the 4 departments and called the Medical Museum. In 1949, when emphasis was placed on unification, the Institute became the Armed Forces Institute of Pathology, extending its services to include the Veterans Administration and the United States Public Health Service, and more recently the Atomic Energy Commission and the Atomic Bomb Casualty Commission.

At the present time, the Institute itself is housed in a specially designed building on the grounds of Walter Reed Army Medical Center. Since April 1947 the Medical Museum has occupied a temporary building on Independence Avenue at Ninth Street SW, within the tourist area of Washington. Unique in the United States in that it is open to the lay public, the Medical Museum is the front window of the military medical profession.

In its present location, emphasis has been directed toward modernization of permanent exhibits. The educational program has been expanded to include exhibits that show results of research and development programs conducted by the Army, Navy, and Air Force.

Figure 1. Exterior view of the Medical Museum of the Armed Forces Institute of Pathology, Independence Avenue at Ninth Street, SW, Washington, D.C.

Figure 2. Hall of Pathology contains exhibits of diseases that afflict mankind.

Exhibits in the Museum are designed to give visitors an insight into the field of military medicine as well as a graphic picture of the many disease processes that afflict mankind.

The Hall of Pathology, perhaps the most interesting part of the museum, includes exhibits of all organs of the body, normal and diseased, with descriptions of their functions and physiologic importance, and of normal and abnormal specimens of embryos and fetuses. The Hall of Anatomy contains illustrated charts, drawings, and cutaway models of the systems of the body, which serve as an introduction to the general field of medicine. Exhibits on malaria, schistosomiasis, hookworm, leprosy, amebiasis, and arthropod-borne diseases are included in the Hall of Tropical Diseases.

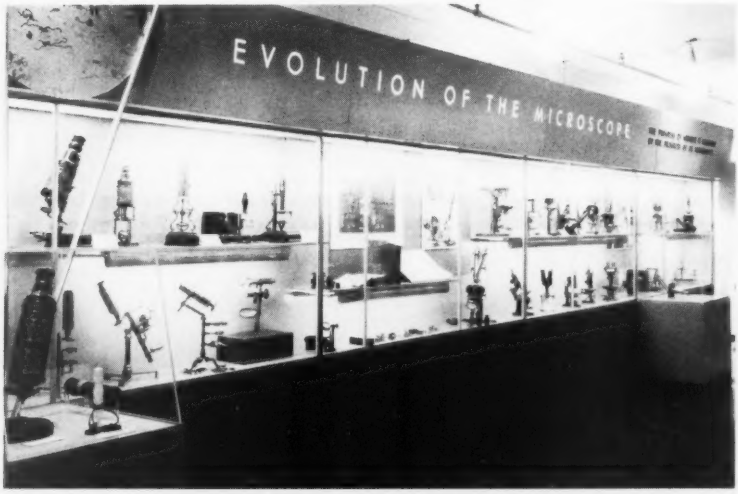


Figure 3. In Hall of Microscopes, antique and modern microscopes are displayed to show development of this fundamental instrument.

The Hall of Microscopes houses a collection that is the largest in this country and probably in the world. In the Instrument Room a wide variety of surgical, medical, and diagnostic instruments are arranged according to their chronologic development.

Of the many medicohistorical exhibits, the assassination of President Lincoln interests many visitors. This exhibit contains the bullet that killed Lincoln, the probe used to remove it, some fragments of bone from his skull, and a lock of his hair.

Exhibits on the research and development programs of the Armed Forces are concerned with space biology, man in space, psychiatry

in the Navy's Operation Deep Freeze, and training aids. These exhibits are changed frequently in order to keep the public informed of the latest developments in the widening field of military medicine.

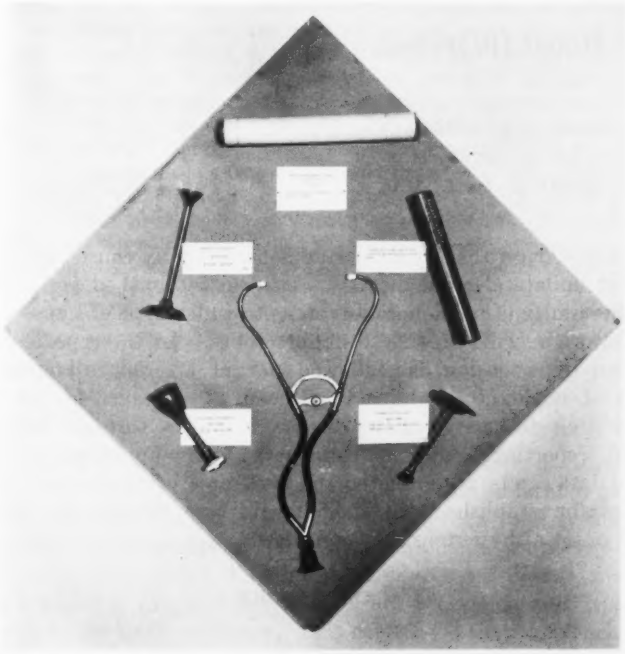


Figure 4. Early stethoscopes displayed in Instrument Room.

In the Sloan Laboratory of Museum Techniques, a vital and integral part of the Medical Museum, gross specimens used for teaching and display are preserved and mounted. Plastic containers are fabricated individually for each specimen, and colored plastic is frequently employed to present specimens attractively. In addition, the laboratory provides training in medical museology and is one of the few places in the world offering this specialized type of training.

The Medical Museum presents the scientific work and achievements of military medicine to the American public. Growing interest in the Museum, both in this country and throughout the world, is evidenced by the constantly increasing number of visitors. During the past 12 months over 340,000 persons toured the Museum, and the register shows that many foreign countries were represented.

Case Reports

Acute Hypertension and Renal Infarction

DONALD E. STRANDNESS, JR., M.D.
JOHN H. SMITH, M.D.
VIRGIL A. PATE, M.D.

THE OBSERVATION that hypertension is occasionally caused by certain types of unilateral renal disease is now an established fact. There is no unanimity of opinion, however, as to which type of hypertension of renal origin will respond to nephrectomy. In the reported cases in which hypertension has followed partial arterial infarction, the results of nephrectomy have been good.[1-6] Because of the rarity of this etiologic variety of the disease, it is only through well-documented reporting, including adequate follow-up, that adequate clinical data can be accumulated and more precise criteria for nephrectomy can be established. In the following case, the time of infarction and of onset of hypertension were known.

CASE REPORT

A 20-year-old Negro youth was admitted to this hospital on 11 April 1958 because of a gunshot wound of the right lumbar area. The weapon used was a 25-caliber rifle, and the wound was inflicted at a distance of 100 feet or less.

On admission the patient's blood pressure was 140/69 mm Hg, pulse rate 80 per minute and regular. The patient had diffuse abdominal rebound tenderness. Bowel tones were present but hypoactive. The point of entry of the bullet was midway between the midportion of the right twelfth rib and the posterosuperior edge of the iliac crest. Hematocrit was 42 ml per 100 ml. Urinalysis showed an acid reaction, a specific gravity of 1.017, 2 plus albumin, and no sugar. Microscopic examination of the urine revealed 1 to 3 white blood cells per high-power field and occasional hyaline casts. Roentgenographic examination of the abdomen showed the bullet lying just to the right and anterior to the second lumbar vertebra.

The absence of hematuria was considered to be sufficient evidence to rule out parenchymal injury to the right kidney. Three hours after injury an exploratory

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laparotomy was performed. A large, nonpulsating retroperitoneal hematoma was found on the right side. No other injury was found. The hematoma was not entered and the abdomen was closed.

After return to the ward, the patient's blood pressure fluctuated considerably but gradually increased. Sixteen hours after injury the blood pressure was recorded as 180/120 mm Hg. Intravenous pyelography was immediately performed and it was noted that the right kidney was nonfunctioning. A right retrograde pyelogram revealed a kidney of normal size and architecture but without function. The diagnosis considered most likely on the basis of these studies was renal arterial infarction. The blood pressure continued to be elevated at 180/100 to 180/120 mm Hg. Thirty-four hours after injury the right flank region was explored. The right kidney was slightly enlarged and was purplish in color. No pulsation could be ascertained in the renal artery. Nephrectomy was performed. The blood pressure ranged between 120 and 130/80 mm Hg by the second postoperative day, and remained at this level. The patient has been followed at monthly intervals for 1 year, and his blood pressure has remained below the generally accepted normal of 140/90 mm Hg, except on 1 occasion when the diastolic pressure was recorded as 95 mm Hg.

Pathologic examination of the surgical specimen showed multiple early thrombi of the right renal artery and its branches, with partial infarction of the kidney.

DISCUSSION

In traversing the soft tissues the bullet did not directly injure the kidney or its pedicle. It has been shown [7] that the most important factor in the degree of damage produced by a high-velocity missile is the amount of energy expended in the formation of a temporary cavity about the missile track. This lateral displacement of soft tissues is only a fraction of a second in duration, but the violence of expansion results in injury to these tissues. It is postulated that this mechanism was responsible for the injury to the renal artery, with subsequent thrombosis.

As mentioned previously, renal injury was suspected at the time of admission because of the location of the bullet wound but considered unlikely because of the absence of hematuria. In retrospect, however, albuminuria may have been an indication of renal arterial infarction. It has been postulated by Deming [8] that when renal infarction occurs renin is elaborated, inducing secretion of albumin by the normal kidney. After removal of the infarcted kidney, albuminuria disappears.

When renal artery thrombosis occurs, intravenous pyelography followed by retrograde pyelography is usually sufficient to make the diagnosis.[9] A normal-sized kidney with normal architecture but without function is the usual finding. In doubtful cases, aortography has proved helpful in substantiating the diagnosis.

The hypertension that occurs with unilateral renal disease is often severe. As Perera and Haelig [10] have pointed out, the hypertension is often of the malignant type. It is characterized by severe headaches, convulsions, and advanced retinal changes. In view of this possibility, immediate nephrectomy was indicated. The prompt fall in the patient's blood pressure to normotensive levels coincides well with the experience of others.

SUMMARY

A case of hypertension developing 16 hours after lumbar gunshot wound is described. Renal infarction observed on surgical exploration was attributed to displacement of soft tissues by the high-velocity missile, followed by violent expansion producing renal artery thrombosis.

The occurrence of acute hypertension and albuminuria in a patient with recent abdominal or back injury suggests renal arterial infarction. The diagnosis of renal artery thrombosis can readily be made by finding a nonfunctioning kidney of normal architecture. As in this case, nephrectomy usually results in prompt return of the blood pressure to normotensive levels.

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A Syndrome of Ataxia, Oculocutaneous Telangiectasia, and Sinopulmonary Infections

CAPTAIN BILLY F. ANDREWS, MC, USA
CAPTAIN FRANCIS M. KOPACK, MC, USA
COLONEL OGDEN C. BRUTON, MC, USA

THE INITIAL DESCRIPTION of the syndrome progressive cerebellar ataxia and oculocutaneous telangiectasia is attributed to Madame Louis-Bar.[1] A period of 16 years passed before other reports followed from various parts of the world and the frequent association of sinopulmonary infections was recognized and added to the syndrome.[2-5] It is of interest that 9 of 20 reported cases came from California.[4] The reported cases occurred in families that had about the same number of unaffected children; and consisted of 12 girls and 8 boys, among whom were 7 pairs of siblings. It is thought, therefore, that the syndrome represents a heredofamilial disorder probably transmitted by means of a simple autosomal recessive gene.[4, 5]

The purpose of this report is to present the twenty-first case with the hope that more physicians may become aware of this disease syndrome and be able to differentiate it from other central nervous system diseases.

CASE REPORT

A 10-year-old white boy was first admitted to this hospital 4 October 1958 for evaluation of "poor coordination." He was the product of the second pregnancy which was normal, and there were no complications in the perinatal or neonatal periods. Birth weight was 7 lb 2 oz. The patient sat alone at 6 months of age. At 12 months he began to walk but was unsteady, falling frequently, and taking steps backward and then forward in a "rocking" fashion. When he was 18 months old, following a work-up for his unsteadiness, his parents were told that he had "spasticity." At other hospitals the diagnosis of cerebral palsy was believed to be incorrect, but no other diagnosis was given the parents. He spoke words at 12 months and began to use sentences at 2 years. Toilet training was accomplished at 2 years.

During the first 2 years of his life the child had repeated episodes of otitis media and upper respiratory tract infections. At 2½ years of age he had an adenoidec-

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From Pediatric Service, Walter Reed Army Hospital, Washington, D.C. Presented on 28 May 1959 at Children's Hospital, Washington, D.C., as part of a conference on central nervous system lesions simulating cerebral palsy.

tomy and after that remained free of ear symptomatology. From that time until he was 6 years old the parents considered his progress to be satisfactory except for occasional falls and episodes of "bronchitis."

The patient began attending school at the age of 6 years and, except for writing, did well. During this year the parents first noticed reddening of his conjunctivas. Drooling and jerky movements of the head and shoulders became noticeable at the age of 7, but he was still able to play baseball, wrestle, and run. At 8½ years, the child complained of jerky movements of his eyes that interfered with reading. The mother first noticed small red spots in the creases of the neck and antecubital fossae when the boy was 9 years old, although there was no increased bruising or bleeding tendency. It was quite apparent at that time that his coordination and gait were becoming progressively worse and his speech slurred. During the 9 months prior to hospitalization the child had increasing difficulty in feeding himself and in writing, reading, and walking, necessitating his removal from school. Despite these changes no mental retardation nor deterioration was noted and the patient remained alert, watched television, and read books. Troublesome respiratory infections, with an average of 2 attacks of pneumonia each year, occurred when the patient was between 6 and 10 years of age.

At the time the patient was hospitalized the father was 42 and the mother 40 years of age. Neither has a history of consanguinity or similar diseases in their families. A 14-year-old sister is in "excellent" health. The mother reported

Figure 1. Telangiectasia of the bulbar conjunctivas and bridge of the nose. Note that the telangiectasia disappears at the edge of the cornea.

Figure 2. Telangiectasia of the external ear.

having had rheumatic fever and seasonal hay fever. The maternal side of the family has numerous members with hay fever but none with asthma. A paternal grandfather had tuberculosis and a great-aunt had diabetes.

The patient had received immunizations for smallpox, diphtheria, pertussis, tetanus, typhoid, typhus, cholera, and poliomyelitis. He had never received serum. Infections had been treated with the tetracyclines, sulfonamides, and penicillin without known reactions. A history of rubeola, rubella, mumps, and varicella was obtained. These were not accompanied by complications.

The child was a well-developed, well-nourished white boy. He was alert and well oriented as to time, place, and person. General manifestations included marked drooling, sad masklike facies, athetoid movements of the entire body, and inability to stand unassisted. His weight was 66 lb. and his height 55 inches. His blood pressure was 90/60 mm Hg. Examination of the eyes revealed horizontally distributed telangiectasia of the ocular conjunctivas (fig. 1). The pupils were equal in size and reacted to light and distance. The left iris had a 2 mm irregular, pigmented brownish area at 1 o'clock. The fundi were normal. A lateral and a fixed nystagmus were present, with constant slow jerking of the eyes. Extraocular movements seemed to be within normal limits but were sluggish. The proximal attachment and the pinnae of the external ears were the site of

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telangiectasia (fig. 2). There was a yellowish nasal discharge. Examination of the mucous membranes revealed no vascular abnormalities. Areas of telangiectasia in the folds of the neck and in the antecubital (fig. 3) and popliteal fossae were the only cutaneous lesions. The lungs and heart were normal by the usual methods of examination, and the abdominal viscera were not abnormally palpable.

Neurologic examination revealed athetoid movements of the body and extremities, consisting of gross swaying of head, shoulders, and trunk; moderate slow jerking of arms, head, and to a less degree of legs; and a moderate distal tremor during writing and fine movements. The child's gait was ataxic, with a wide base and a slapping, high-stepping appearance that seemed to be related to extensor weakness. He could not walk or stand unassisted. The Romberg test could not be evaluated because the patient swayed equally to either side. Bilateral adiadochokinesis, past pointing of the fingers, and slow deliberate movements in the heel-to-shin tests were present. Bilateral facial weakness and minimal weakness of the arm and leg extensor muscle groups, without atrophy or spasticity, were noted. Deep tendon reflexes were hypoactive, but superficial abdominal and cremasteric reflexes were present. Pain, touch, temperature, and vibratory senses were intact. There was no astereognosis. Plantar flexion occurred bilaterally and there was no clonus. Memory for past and recent events, ability to add, subtract, and multiply, and comprehension appeared within normal limits.

Roentgenograms of the skull and chest and electroencephalogram were within normal limits. The spinal fluid was clear, under no increased pressure, and showed the following: leukocytes 3 per cu mm, glucose 63 mg per 100 ml, total protein 38 mg per 100 ml, chlorides 122 mEq per l, colloidal gold 0000000000, and a negative serologic test. Hematologic studies revealed a white blood cell count of 6,200 per cu mm, with a normal differential; hemoglobin 13.7 grams per 100 ml;

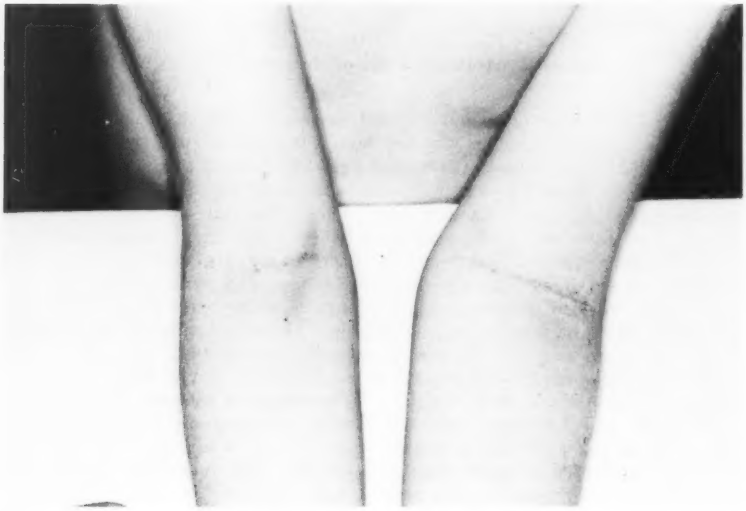

Figure 3. Telangiectasia of the antecubital fossae.

hematocrit 41 ml per 100 ml; platelets 244,000 per cu mm; bleeding time 2¼ minutes; clotting time 3½ minutes; and a normal Rumpel-Leede test. Urinalysis was within normal limits and a urine phenylpyruvic acid test was negative. Serologic examination was negative. Blood chemistry and liver function studies revealed calcium 5.3 mEq per l, phosphorus 5.3 mg per 100 ml, blood urea nitrogen 15 mg per 100 ml, cephalin flocculation 2 plus (considered within normal limits), and thymol turbidity 1 unit. Protein electrophoresis showed 560 mg of gamma globulin per 100 ml. Purified protein derivative skin test gave no reaction.

Subsequent to this study the patient was also evaluated at the National Institute of Neurological Diseases and Blindness, National Institutes of Health, where test for urinary amino acids, arteriography of left common carotid artery, liver function studies, and thyroid studies were interpreted as normal. Psychologic testing with the Wechsler intelligence scale for children was interpreted as "borderline," presumably the result, in part, of the child's restricted opportunity to lead a normal life. The gamma globulin level was 5 percent of total protein.

DISCUSSION

The presenting symptoms, physical findings, and laboratory results in our patient are similar to those described by other authors.[1-4] A heredofamilial aspect cannot, however, be proved. The syndrome of ataxia and telangiectasia involving the skin and eyes appears to be closely related to the phakomatoses. The suggestion has been made that it is a fifth member of the group that comprises cephaloretinal angiomatosis or Lindau-von Hippel disease, cerebral angiomatosis or Sturge-Weber syndrome, neurofibromatosis or von Recklinghausen's disease, and tuberous sclerosis or Bourneville's disease. Although evidence is not available, it is postulated that a metabolic disturbance may be the basic defect in the syndrome. In other syndromes whose exact nature is known, clinical and pathologic findings have been determined first and subsequent biochemical investigation has revealed the basic intercellular or intracellular metabolic defect producing the entity. Until the metabolic defect of the syndrome under discussion is understood, the clinician can only supply these patients with antibiotics for their sinopulmonary infections, provide them with physical and occupational therapy for their psychologic and neuromuscular needs, and watch them slowly deteriorate. In the case presented here, the apparent hypogammaglobulinemia and the history of recurrent infections suggest that supplementary gamma globulin may be of possible value.

SUMMARY

The syndrome of ataxia and telangiectasia occurring in a 10-year-old white boy is described, bringing the number of cases reported in the

literature to 21. It is believed that the syndrome represents a fifth entity in the group of phakomatoses. This disease may be the result of an intracellular or intercellular metabolic defect. Not until the basic defect is discovered can a rational therapeutic approach be provided to relieve an apparently increasing number of patients crippled with this condition.

ACKNOWLEDGMENT: We wish to acknowledge especially the coordinated effort of Dr. William R. Lewis and associates for the studies performed at the National Institute of Neurological Diseases and Blindness, Bethesda, Maryland.

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THE DECLINE OF TYPHOID FEVER

In 1910 Major Carl R. Darnall of the Army Medical Service originated the use of liquid chlorine to purify water. The method has been adopted throughout the world and, by reducing typhoid fever and other waterborne diseases, has probably saved as many lives as any other medical achievement. There were only 50 cases of typhoid in this country last year, despite a low level of vaccination among the civilian population. Thanks to the combination of typhoid fever vaccination and chlorinated water, there were less than 100 cases of typhoid-paratyphoid fever among United States troops during three years of the Korean conflict, despite widespread water pollution and other highly unsanitary conditions.—U.S. Army Medical Service Contributions to Civilian Health and Medicine. *Ohio State Medical Journal*, March 1959.

Military Medical News

Rear Admiral Bradley Retires

Rear Admiral Bruce Emanuel Bradley, MC, USN, commanding officer of the National Naval Medical Center, Bethesda, Md., since June 1959, retired 31 March, terminating more than 33 years of active naval service. Succeeding him is Rear Admiral Frank P. Kreuz, Jr., MC, USN, former deputy commander of the Center and commanding officer of the U.S. Naval Hospital, Bethesda.

Receiving his degree from the University of Virginia School of Medicine in 1926, Admiral Bradley was commissioned lieutenant (jg) in the U.S. Navy. Prior to and following the United States' entry into World War II, he served as assistant medical officer of the U.S. Naval Dispensary, Navy Department, Washington, D.C. He subsequently attended the Naval War College, Newport, R.I., and in November 1943, was assigned as senior medical officer of an advanced naval base in the Solomon Islands area. During this tour he was awarded the Legion of Merit with Combat "V" for exceptionally meritorious conduct while administering medical aid to the casualties.

Further assignments took him to Finschhaven, New Guinea, as medical officer-in-charge of Base Hospital 14, and to Long Beach, Calif., where he served as executive officer of the naval hospital. Following his command of naval hospitals at Key West, Fla., and Oakland, Calif., Admiral Bradley was designated deputy surgeon general, U.S. Navy, and assistant chief of the Bureau of Medicine and Surgery, Washington, D.C., a position he held until his last command at the Medical Center in 1959.

Upon his retirement the Admiral will become medical director of the Bankers Trust Company, New York, N.Y.

Space Flight Meeting

A symposium on "The Psychophysiological Aspects of Space Flight," sponsored by the School of Aviation Medicine, will be held at the Aerospace Medical Center, Brooks Air Force Base, Texas, 26 and 27 May. Lieutenant Colonel Bernard E. Flaherty, USAF, MC, chief, neuropsychiatry section, School of Aviation Medicine, and symposium chairman, has announced a varied program to include reports by authorities in psychiatry, physiology, endocrinology and engineering.

The following participants and presentations are included in the program: Dr. Nathaniel Kleitman, University of Chicago, "Physiological Cycling"; Dr. Ernst Stuhlinger, Army Ballistic Missile Agency, who will outline the framework for existing spacecraft; Dr. Philip Solomon, Harvard University, "Fear, Anxiety and Motivation"; Dr. D. Ewen Cameron, Allen Memorial Institute, Montreal, Canada, "Sensory Deprivation"; Dr. James G. Miller, University of Michigan, "Sensory Overloading"; Dr. Roy M. Dorcus, University of California, "Conditioning and Hypnosis"; and Dr. F. John Lewis, Northwestern University, "Hypothermia."

GORGAS PLAQUE PRESENTED. During the recent dedication of a laboratory for the Medical Science Liaison Unit, U.S. Navy, at Gorgas Memorial Laboratory, Panama City, Republic of Panama, Rear Admiral Lewis S. Parks, USN (left), commandant, 15th Naval District, Caribbean Defense Command, presented a plaque to Dr. Alberto Bissot, Jr., director of Public Health, Panama. The plaque bears the names of U.S. Naval personnel who have been assigned to the Laboratory since 1931. Dr. Bissot, a member of the Scientific Advisory Committee, Gorgas Memorial Institute, accepted the presentation on behalf of the Laboratory for Dr. Carl M. Johnson, director of the Institute.

Texas Medical Lectureship Set

The first annual Lectureship in Medicine, sponsored by the Methodist Hospital, Lubbock, Texas, will be held 7 May at the Tom S. Lubbock High School. The program will consist of three sessions: "Autoimmune Disorders"; "Myelo- and Lymphoproliferative Disease"; and "Intrinsic Abnormalities and the Erythrocyte." Guest speakers include Lieutenant Colonel William H. Crosby, Jr., MC, USA, Washington, D.C., Dr. Joseph Hill, Dallas, Texas, and Dr. William Dameshek, Boston, Mass. Military and civilian physicians are invited to attend.

Official Decorations

The following awards were recently announced by the Departments of the Army and the Navy.

Legion of Merit

Bond, George F., Comdr. MC, USN

Army Commendation Ribbon with Metal Pendant

Valentine, Robert G., Lt. Col., MSC, USA

Progress Notes

Rear Admiral **Winchell McK. Craig,** USNR, Ret., former head of neurologic surgery, Mayo Clinic, and special assistant for health and medical affairs to the Secretary of Health, Education, and Welfare since 1959, died in Saint Mary's Hospital, Rochester, Minn., 12 February. Dr. Craig was the first medical officer in the naval reserve to be promoted to flag rank . . . Colonel **Charles H. Snider,** USAF, VC, director of veterinary medicine, Walter Reed Army Institute of Research, Washington, D.C., has announced the graduation of the first class in "Veterinary Aspects of Nuclear Medicine," held at the Institute from 1 to 12 February. The course, which provides training for Army and Air Force veterinarians in certain areas of nuclear medicine, will resume 9 May and be held periodically thereafter . . . Captain **Max J. Brandt,** DC, USN, Boston Naval Shipyard, has assumed command of the Naval Dental Clinic, Guam . . . Commander **Roger Stevenson,** MC, USN, U.S. Naval Hospital, Corpus Christi, Texas, has been elected a fellow in the American Academy of Ophthalmology and Otolaryngology.

Major **Jack Hermanson,** MSC, USA, former executive officer, 44th Surgeon's Hospital, Korea, is the new executive officer, U.S. Army Hospital, Fort Huachuca, Ariz. . . . Colonel **Joseph F. Siler,** MC, USA, Ret., founder, member and president (until 1957) of Gorgas Memorial Institute of Tropical and Preventive Medicine, Panama City, Panama, and president of the Walter Reed Memorial Association, Washington, D.C., died at his home in Washington on 7 February. Well known for his work in typhoid fever, Colonel Siler was a major contributor in developing a simpler and more effective typhoid vaccine.

Captain **Michael Dmytrenko,** MC, USN, head, Dependents Medical Outpatient Clinic, Great Lakes Naval Hospital, Great Lakes, Ill., was recently promoted to his present rank . . . Captain **William M. Snowden,** MC, USN, U.S. Naval Air Station, North Island, San Diego, Calif., has been elected a fellow of the American College of Preventive Medicine . . . Captain **William L. Engelman,** MC, USN, U.S. Naval Hospital, National Naval Medical Center, Bethesda, Md., is the new commanding officer of the U.S. Naval Hospital, Jacksonville, Fla.

Lieutenant Colonel **Joseph W. Cooch,** MC, USA, chief, Communicable Disease Branch, Preventive Medicine Division, Army Surgeon General's Office, visited U.S. medical installations in the Near East in March to determine medical problems facing these units. During his survey, conducted in Ethiopia, Saudi Arabia, Pakistan, Iran, and Turkey, Colonel Cooch observed disease conditions of the native populations to determine whether the Army's preventive medicine team can be of assistance in their control.

Captain **Horace D. Warden,** MC, USN, U.S. Naval Hospital, Philadelphia, Pa., has been elected a fellow of the American College of Surgeons and a member of the Philadelphia Academy of Surgery . . . Captain **Joseph L. Yon,** MC, USN, chief, surgical service, U.S. Naval Hospital, Camp Lejeune, N.C., will assume command of the naval hospital at Newport, R.I. . . . Commander **Rosario A. Fisichella,** MC, USN, U.S. Naval Hospital, San Francisco, Calif., has been elected a fellow in the American College of Obstetricians and Gynecologists.

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This Is Your A.M.A.

THIS IS THE SECOND AND CONCLUDING PART of a report on the results of a continuing opinion survey of physicians released from active military service. The first part of this report appeared in the April issue of the *U.S. Armed Forces Medical Journal*. This summary is based on 730 returns received out of a total of 1,346 questionnaires distributed in 1958 by the Council on National Security of the American Medical Association.

Physicians' Evaluation of Staffing Conditions

One of the questions was designed to obtain the opinion of physicians as to staffing conditions of nurses, enlisted medical personnel, physicians, dentists, and others in the 2 units where the physician served his longest and next longest assignments. With respect to the longest assignment, the tabulation of this multiple-answer question indicated that in the Army, replies indicating overstaffing totaled 165, understaffing 359, and adequate staffing 991. In the Navy, overstaffing totaled 27, understaffing 23, and adequate staffing 119. The Air Force tabulation revealed 135 replies of overstaffing, 297 of understaffing, and 606 of adequate staffing.

The response to the question concerning the next longest assignment revealed that in the Army overstaffing totaled 85, understaffing 139, and adequate staffing 605. In the Navy, the results were 20, 16, and 84, respectively, while the Air Force tabulation was 70, 103, and 299, respectively. Table 14 reflects, in detail, the percentages relative to overstaffing, understaffing, and adequate staffing conditions in the 3 military services for the physicians' longest and next longest assignments.

Unnecessary or Wasted Aspects of Military Training

There were 225 physicians who responded affirmatively to the question, "Were there any aspects of your military training that were unnecessary or wasted?" Negative answers were received from 469 medical officers. Thirty-six physicians did not reply to this question. With respect to the affirmative replies, the most frequently mentioned area of waste was in the performance of nonmedical duties. Table 15 shows the responses to this question by military service.

Making Military Service More Attractive

There were 642 physicians who offered suggestions for making military service more attractive for physicians. Only 75 physicians thought that nothing could be done to make military service more attractive to medical men. In both the 1957 and 1958 surveys the most popular suggestion was a pay increase. Table 16 sets forth the suggestions from physicians in the 3 branches of military service.

Improvement of Services to Military Physicians by Medical Associations

A total of 166 physicians (23 percent) offered suggestions in response to the question concerning the role of national and local medical associations in maintaining closer contact or rendering better service to their members who served as physicians in the Armed Forces. Some physicians offered more than 1 suggestion. The multiple suggestions are tabulated in table 17. The other 564 physicians who returned the questionnaire offered no suggestions.

From the Council on National Security of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.—EDITOR.

Table 14. ***Medical staffing conditions in the Armed Forces***

Assignment	*Nurses (percent)*	*Enlisted medical personnel (percent)*	*Physicians (percent)*	*Dentists (percent)*	*Others (percent)*	*Total (percent)*
LONGEST						
Army						
Overstaffed	2.8	9.1	12.1	18.9	18.9	10.9
Understaffed	31.2	22.1	27.7	10.8	43.2	23.7
Adequate	66.0	68.8	60.2	70.3	37.9	65.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Navy						
Overstaffed	–	8.5	30.4	20.0	50.0	16.0
Understaffed	17.6	12.8	10.9	12.5	50.0	13.6
Adequate	82.4	78.7	58.7	67.5	–	70.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Air Force						
Overstaffed	7.5	9.7	10.4	22.4	38.5	13.0
Understaffed	37.9	27.0	32.8	14.5	42.3	28.6
Adequate	54.6*	63.3	56.8	63.1	19.2	58.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
NEXT LONGEST						
Army						
Overstaffed	3.3	8.1	15.9	12.5	13.3	10.2
Understaffed	20.9	18.0	19.5	7.6	20.0	16.8
Adequate	75.8	73.9	64.6	79.9	66.7	73.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Navy						
Overstaffed	3.7	15.2	33.3	11.1	–	16.7
Understaffed	18.6	15.1*	15.2	3.7	–	13.3
Adequate	77.7	69.7	51.5	85.2	–	70.0
Total	100.0	100.0	100.0	100.0	–	100.0
Air Force						
Overstaffed	7.9	15.7	14.3	20.6	27.3	14.8
Understaffed	28.1	16.5	26.9	14.0	36.4	21.8
Adequate	64.0	67.8	58.8	65.4	36.3*	63.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

*Forced to total 100 percent.

Physicians Who Would Voluntarily Remain in Service

In response to the question relative to military service beyond the obligatory tour of duty, 384 physicians indicated they would not be willing to stay in military service for more than 2 years of service under any conditions except total war. There were 330 physicians who indicated they would serve an additional period under certain conditions. Some physicians listed more than 1 condition. Sixteen physicians did not reply to the question. Table 18 reflects the reasons or conditions under which an additional period of service would be acceptable.

Table 15. ***Unnecessary or wasted aspects of military training***

Area of waste	*Army*		*Navy*		*Air Force*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Not in field for which trained	16	12.3	2	10.0	4	5.1
No training or experience in field	2	1.5	–	–	–	–
Capable of more responsible medical duties	7	5.4	5	25.0	4	5.1
Nonmedical duties	57	43.8	4	20.0	28	35.9
Miscellaneous	40	30.8	8	40.0	36	46.2
No reason given	8	6.2	1	5.0	6	7.7
Total	130	100.0	20	100.0	78	100.0

Table 16. ***Physicians' suggestions for making military service more attractive to medical men***

Suggestion	*Army*		*Navy*		*Air Force*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Increase in pay	130	13.1	15	13.3	95	14.2
Some hospital assignments	117	11.8	10	8.8	74	11.1
Choice of stable location	90	9.1*	15	13.3	70	10.4
Occupy regulars better	93	9.4	12	10.6	62	9.3
Less administrative nonmedical duties	58	5.8	4	3.5	48	7.2
Less discrimination against reservists—equal opportunity	55	5.5	3	2.7	49	7.3
Freedom from nonmedical military interference	53	5.3	4	3.5	46	6.9
Duties in line with training and experience	59	5.9	8	7.1	24	3.6
Promotion based on merit, not longevity	31	3.1	8	7.1	32	4.8
Reduce or abolish dependent care	43	4.3	6	5.3	22	3.3
Other	266	26.7	28	24.8	147	21.9
Total	995	100.0	113	100.0	669	100.0

*Forced to total 100 percent.

Preferred Branch of Service for Practice of Medicine

In response to the question of preference if the physician were going to practice medicine in a Federal Government agency, 331 physicians stated a preference for the Armed Forces. A total of 233 physicians expressed a preference for other agencies of the Federal Government, 141 had no preference, and 25 did not answer. Of those who preferred the Armed Forces, the majority chose the branch of service in which they had served. Table 19 sets forth the preferences as to branch of service.

Table 17. ***Suggestions for improvement of services furnished by medical associations to military physicians***

Suggested society activities	*Army*	*Navy*	*Air Force*
More information, newsletters, et cetera	29	3	19
Personal visits by civilian physicians to evaluate grievances	34	3	16
Invitation of military physicians to civilian medical meetings	31	4	40
Asistance in locating a position after discharge	4	1	4
Distribution of questionnaire to physicians in service	8	3	8
Assist in providing military medical training in medical college	4	1	3
Provision of specialists for clinical conferences	7	3	4
Miscellaneous suggestions	11	1	4
Total	128	19	98

Distribution by Rank at Time of Discharge

The majority of physicians in the Army and Air Force held the rank of captain at the time of their release from active military duty, while those separated from the Navy held the rank of lieutenant, junior grade. There were 674 physicians who answered this question. The survey indicated that approximately 4 percent of those who reported were in the lowest rank, while 80 percent held the rank of captain (Army or Air Force) or lieutenant, senior grade (Navy). There were approximately 16 percent with the rank of major or lieutenant commander and higher. Table 20 indicates the number and percentages by rank within the 3 services.

Length of Active Service as a Medical Officer

In the Army 408 responding physicians served an average (median) of 24 months in the United States and 201 responding physicians served an average (median) of 21 months at overseas stations. There were 47 naval medical officers who had

Table 18. ***Distribution indicating conditions of voluntary extension of service beyond 2-year requirement***

Condition	*Army*		*Navy*		*Air Force*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Demonstrated need	10	4.2	–	–	1	0.6
All doctors serving on an equitable basis	3	1.2	–	–	3	1.9
Promotion to higher rank	7	2.9	1	2.9	9	5.7
Increase in pay	32	13.3	1	2.9	30	19.0
Given residency or further training	38	15.8	10	29.5*	29	18.4
Opportunity to practice specialty	18	7.5	3	8.8	6	3.8
Choice of duty assignment	33	13.8	6	17.7*	21	13.3
Choice of stable location	45	18.8	8	23.6*	24	15.2
Living quarters for family	11	4.6	3	8.8	10	6.3
Request for extension of status quo refused	5	2.1	–	–	3	1.9
Extended service time voluntary	17	7.1	1	2.9	9	5.7
Miscellaneous conditions	21	8.7	1	2.9	13	8.2
Total	240	100.0	34	100.0	158	100.0

*Forced to total 100 percent.

Table 19. ***Preferred branch of service for practice of medicine***

Choice of military service	*Army*		*Navy*		*Air Force*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Army	137	77.4	–	–	3	2.4
Navy	3	1.7	24	88.9	2	1.6
Air Force	24	13.5	2	7.4	118	92.9
No preference	12	6.8	1	3.7	4	3.1
No answer as to branch of service	1	0.6	–	–	–	–
Total	177	100.0	27	100.0	127	100.0

Table 20. ***Distribution of physicians by rank at time of discharge***

Rank	*Army*		*Navy*		*Air Force*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
First lieutenant-lieutenant, junior grade	–	–	27	57.4	3	1.2
Captain-lieutenant, senior grade	298	78.6	13	27.7	227	91.5
Major-lieutenant commander	74	19.5	4	8.5	17	6.9
Lieutenant colonel-commander	6	1.6	3	6.4	1	0.4
Colonel-captain	1	0.3	–	–	–	–
Total	379	100.0	47	100.0	248	100.0

an average (median) of 18 months of active duty in the United States and 25 naval medical officers had an average (median) of 10 months overseas. Responses from 257 physicians in the Air Force revealed an average (median) tour of duty of 24 months in the United States, and 106 physicians in the Air Force had an average (median) tour of duty of 21 months at overseas bases.

Reserve Status

Of the 730 physicians reporting, 351 indicated they retained their reserve commissions while 375 resigned their commissions. There were 4 who did not respond. By services, the Army had 154 retaining commissions and 263 resigning; the Navy had 42 retaining and 4 resigning; and the Air Force had 155 retaining and 108 resigning their commissions. Table 21 reflects the percentages by branch of service.

Table 21. ***Percentage distribution of physicians according to Reserve status***

Reserve status	*Army (percent)*	*Navy (percent)*	*Air Force (percent)*
Retained commission	36.9	89.4	58.5
Resigned commission	62.9	8.5	40.8
No response	0.2	2.1	0.7
Total	100.0	100.0	100.0

Book Reviews

TABULATING EQUIPMENT AND ARMY MEDICAL STATISTICS, by Brig. Gen. *Albert G. Love,* USA (Ret.), Col. *Eugene L. Hamilton,* MSC, USAR and *Ida Levin Hellman,* M. Sc. 202 pages; illustrated. Office of the Surgeon General, Department of the Army, Washington, D.C., 1958. Price $2. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

The purpose of this small volume is described clearly in the preface by Lowell J. Reed. He says: "It is an excellent record of the evolution of medical statistics in effective use, rather than as statistics gathered for their own sake . . . . General Love . . . capitalized on the potentialities of data gathered on a population base and with opportunity for follow-up . . . which have made a unique scientific contribution." The book contains a foreword by Maj. Gen. S. B. Hays, at the time of publication The Army Surgeon General. The 12 chapters begin with the early history of military medical records, and describe their part in military medicine to the present day, including reports of such achievements as those of William Beaumont, with his window in St. Martin's stomach. Chapter IV describes the beginnings of punched card tabulating under the auspices of Col. John Shaw Billings and of Herman Hollerith, whose name most of us have associated with the early U.S. censuses. Chapter VIII traces the origins of the present complete and comprehensive system of Army morbidity reporting, showing in pictures the evolution of the report forms. (We note that the instructions for the preparation of these reports formerly were printed on the back of the forms themselves; now they are generally given in regulations distributed separately.) It was just a bit disappointing to find Love's earlier work, "War Casualties," Army Medical Bulletin No. 24, 1931, receiving a mere footnote mention instead of being recognized as the springboard for what ought to become an era of greater and more significant contributions by medical statistics to medical science. This reviewer greatly admires the several authors of this volume (including those of the foreword and preface) and thus has enjoyed reading their views on this subject of common interest. The book presents two theses, as one might expect from the title: (1) that military medical statistics have made great contributions to medical knowledge, and (2) that the invention of punched card tabulating played a significant role in this effort. The first thesis is confined mainly to the 40 pages of chapters VI and VII, although the history of Army medical statistics is liberally described throughout the text, with emphasis on the World War I period and following. As to the second thesis, fortunately the book avoids the pitfall of implying that without tabulating machines there would have been no statistics. The Army takes justifiable pride in being an early discoverer of the punched card technic, which has become a household word in government and business. The impression gained is that military medical statistics was not always in the luxury category, where the economy-minded tend to place it now—something to be enjoyed in good times only. At present the implication is all too common in the military services that since a clinical abstract is not a direct instrument for destroying an enemy weapon, the cost of its preparation can barely be justified and the small added effort needed for statistical processing is sheer waste. The authors recognize the danger of this fallacy by pointing out: ". . . the whole general level of quality of medical service policy and operating decisions is affected by . . . quantitative facts about medical service experience.

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When this flow [of facts] is impeded . . . evaluations, judgments, and decisions come to be more and more based on information which is no longer valid, on intuition, and on guesswork." It is hoped that today the pendulum has swung far enough in the direction of austerity, and that the return to an appreciation of the need for clear, accurate, and objective information for wise decision-making has begun.

H. M. C. LUYKX, D.SC.

CLINICAL PROSTHETICS FOR PHYSICIANS AND THERAPISTS, A Handbook of Clinical Practices Related to Artificial Limbs, by *Miles H. Anderson*, Ed.D., *Charles O. Bechtol*, M.D., and *Raymond E. Sollars*. 393 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $10.50.

This book is of the reference type and represents a compilation of previously published manuals in the fitting and training of the amputee. The book is divided into 2 sections; the first considering the upper-extremity amputee, and the second, the above-knee amputee. In each section consideration is given to discussion of types of prosthetic evaluation, the efficiency of the devices, and the training in their use. The section concerned with the above-knee amputee also includes a presentation of the method by which the prosthesis for the above-knee amputee is fitted. Unfortunately, the book does not include some amputation types commonly presented before the clinical teams. It appears that a more comprehensive treatment of the whole amputee problem would have been in order as a guide for training, particularly for therapists. It also seems that the title of the book is an unfortunate one for the above reasons; it is misleading in that it does not cover the broad field of clinical prosthetics, but only a limited segment of the field of their application. The format of the book is somewhat confusing in that quite frequently illustrations that are meant to accompany the text occur at some distance from the written material. Frequent use is made of line drawings and these are of good quality. The photographs, however, are reproduced in a less satisfactory manner, and on occasion appear to border on the commercial advertisement type. The book contains a reasonably complete index but no bibliography. In general, though limited in its scope, this reference book will be of some benefit to those physicians and therapists engaged in the management of the amputee. For the physician, most of the material is extremely elementary, but for the therapist the specific sections relating to training should be helpful.

COL. MAURICE J. FLETCHER, MSC, USA

CANCER OF THE BREAST, compiled and edited by *Willard H. Parsons*, M.D., F.A.C.S., with a foreword by *Warren H. Cole*, M.D., F.A.C.S. 232 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.50.

This monograph on cancer of the breast is part of the American Lecture Series edited by Michael DeBakey. This particular monograph contains contributions of a number of authorities in the fields of anatomy, pathology, radiology, and surgery. It somewhat duplicates a monograph by Dr. Robert S. Pollack (Treatment of Breast Tumors, Lea & Febiger, 1958), but is limited to cancer. There are chapters on anatomy, pathology, diagnosis, preoperative and postoperative care, surgical technic, including the radical, simple, and supraradical operations, radiotherapy, and hormonal treatment. Dr. Parsons writes a summarizing chapter on the present status of cancer of the breast with the philosophy of the various concepts and treatments. This book is an excellent summary and would be an excellent handbook for the average surgeon doing breast surgery.

COL. ROBERT M. HARDAWAY, MC, USA

HISTORY OF THE AMERICAN DIETETIC ASSOCIATION, 1917–1959, edited by *Mary I. Barber*. 328 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.

The national crisis in 1917 and the need for food conservation, together with a desire to serve the military and civilian population, brought about the decision to form an independent group of dietitians. The original organization, 39 charter members, has now grown to a membership of 12,000. A description of the development of the organization with its broadening scope and programs is followed by a review of the leadership of successive presidents and the themes of programs for the annual national conferences. Although one chapter is devoted exclusively to the military dietitian, it is evident throughout the entire book that military, government services, and civilian dietitians have been dependent upon each other, and their contributions to the profession cannot be separated. The background information contained in this book will give the military dietitian an understanding of the work that has been accomplished in achieving the dietitian's present status. Every dietitian will want a personal copy.

COL. AUDREY A. UNDERKOFLER, USAF, MSPC

LECTURES ON THE INTERPRETATION OF PAIN IN ORTHOPEDIC PRACTICE, by *Arthur Steindler*, M.D.; (hon) F.R.C.S. (Eng); (hon) F.R.S.M. (Eng); F.A.C.S.; (hon) F.I.C.S., with anatomical dissections by Dr. *Rodolfo Cosentino*. 733 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $18.50.

This volume was written by a world-esteemed orthopedist, who died shortly after finishing this masterful work. The approach to the multiplicity of orthopedic problems from the standpoint of pain is most interesting and instructive. The author has succeeded in accomplishing his mission of analyzing and interpreting pain, which he felt was a "neglected feature both in clinical practice and in the teaching of orthopedic surgery". The format consists of 16 lectures commencing with a fairly concise anatomic, physiologic, and clinical approach to pain mechanisms. Next are described the autonomic pathways and their relation to pain syndromes under pathologic conditions. Three lectures follow on joint, on muscle, tendon, and fascial, and on bone pain, with an integration of these areas and painful disease entities associated with them. Neuralgia, causalgia, and phantom pain are included in a single lecture, and also discussed are minor reflex dystrophies, painful neuroma, and neuralgic pain in peripheral vascular disease. A separate lecture on central pain reviews the anatomy of the thalamus and of the ascending pathways in the cord, and their radiation in the cerebral cortex. Although this section does not constitute a complete work on neuroanatomy or neurophysiology, it is, nonetheless, a better review than is found in most orthopedic texts. The final half of the book takes up regional pain problems and ties together the previous lectures with the specific regional problems in a detailed and analytic manner. The section on lumbosacralgia and sciatica alone makes the volume most valuable, for the author analyzes the disk problem differentially, giving complete indications for both conservative and operative management of these associated painful disturbances based upon pathomechanics. Carefully selected line drawings, photographs of unusually clear anatomic dissections, plus fine illustrative photographs of clinical entities help to make the well-written text even more lucid. A full bibliography is given at the end of each lecture. This is a book which all orthopedists should read and possess. It should be readily accessible to all others concerned with the diagnosis and treatment of painful musculoskeletal diseases and their visceral and vascular counterparts.

COMDR. ROBERT H. BROWN, MC, USN

THE PHYSIOLOGY AND TREATMENT OF PEPTIC ULCER, edited by *J. Farrott Allen*, with 11 contributors. 236 pages; illustrated. University of Chicago Press, Chicago, Ill., 1959. Price $7.50.

Written to honor Dr. Lester R. Dragstedt on the occasion of his retirement, this book epitomizes the current methods of diagnosis and treatment of peptic ulcer at the University of Chicago Clinics. The first 4 chapters outline the pertinent physiology, and summarize Dr. Dragstedt's important contributions to this field of knowledge. The cephalic phase of gastric secretion and the effects of vagotomy on the stomach are well demonstrated by various experimental preparations. The gastric phase of secretion is illustrated by reports of studies in dogs with isolated gastric pouches. The effects of antral exclusion, antrum ablation, and antrum transplantation document the importance of the hormone gastrin, which is produced by mechanical stimulation of the antrum and inhibited by the presence of free hydrochloric acid. Individual chapters on duodenal ulcer discuss the diagnosis, medical management, surgical procedures, and results of vagotomy and gastroenterostomy. There are 2 chapters on gastric ulcer, and a final one by the editor recounting the influence of physiologic observations on treatment of peptic ulcer. Duodenal ulcer is characterized by an increase in the total quantity of hydrochloric acid secretion. The stimulus for this arises in the hypothalamus and is transmitted by the vagus nerve to the secretory cells of the stomach. Vagotomy removes this stimulus, but must be combined with gastroenterostomy or other drainage procedure to prevent gastric stasis, which would stimulate the production of gastrin. Gastric ulcer is often the result of gastric stasis which produces excessive acid secretion by antrum hyperfunction. If surgery is needed, antrectomy (hemigastrectomy) with Billroth I anastomosis is recommended. Experience with X-irradiation of the stomach for gastric ulcer is reported, and there is a discussion of the problem of distinguishing benign from malignant gastric ulcer. This is a splendid book for all who treat patients with peptic ulcer.

COL. BENJAMIN H. SULLIVAN, JR., MC, USA

GOUTY ARTHRITIS AND GOUT, An Ancient Disease with Modern Interest, by *Thomas E. Weiss*, M.D., F.A.C.P., and *Albert Segaloff*, M.D., F.A.C.P. 221 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.50.

All physicians would welcome a detailed reference manual for those diseases that are relatively common, satisfactory to treat; about which a great deal is known, even more suspected, but without a definitive etiology. This is such a book. The authors offer this book as a usable reference for student, clinician, and investigator. It appears that their efforts in this direction have been rewarded. The book covers gout and gouty arthritis from every useful and interesting aspect, including history, etiology (known facts), physiology, pathology, clinical manifestations, laboratory and roentgenographic observations, diagnosis of associated diseases, treatment, and prognosis. The rare reported case of chronic gout of the skin is not mentioned but is seldom of clinical significance except from an academic viewpoint. The volume is well written, easy to read, with excellent black-and-white illustrations, and all in a text of reasonable length. There is a complete and up-to-date bibliography for those desiring more detailed reading of any one ramification of this highly interesting disease. An excellent index is included for quick reference. Physician, as well as student, will find this a useful, stimulating, authoritative, and practical reference manual, worthy of any medical library.

COL. JULES J. MC NERNEY, USA, MC

HYPNOSIS IN ANESTHESIOLOGY, by *Milton J. Marmer*, M.D., M.Sc. M.E.D (Anes.), with a foreword by *John B. Dillon*, M.D. 150 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $6.75.

This adequately bound small volume, which includes 20 pages of index and 10 of bibliography, is divided into 8 chapters. A review of the history of hypnosis, through Mesmer, to the present is followed by a discussion of the psychologic and psychophysiologic aspects of the technic, procedures for induction, and its uses in anesthesiology. As an adjunct to the chemical armamentarium of the professional anesthesiologist, hypnosis can reduce preoperative fear and medication; raise pain threshold; reduce anesthetic and analgesic agents; aid postoperative recovery by hypnotic suggestions; and reduce or replace conventional anesthetic agents. It is quickly apparent that the degree of rapport obtained, influenced by such fixed factors as pain, age, and mental capacity of the recipient, will usually determine the effectiveness of this method. Although each anesthesiologist uses it to some extent as he makes his rounds, the author points out that postanesthetic suggestions are effective only when made during partial or complete hypnosis. Use during deliveries is considered impractical for the anesthesiologist because of the improbability of gaining the necessary attention of the mother after labor has begun. The author suggests that the obstetrician himself might easily offer considerable benefit to his patient by establishing hypnosis during the prenatal period and using posthypnotic suggestions to gain rapid rehypnosis during early labor. Since rehypnosis is presumably more easily accomplished, there seems to be great potential in continuing research on its value in suppressing undesirable symptoms in such conditions as inoperable carcinoma, chronic alcoholism, and narcotic and tobacco addiction. The book contains no illustrations and none are deemed necessary. It can be read and understood in an hour or two and will intrigue the anesthesiologist whether or not he agrees with the author.

COL. ROBERT F. CORWIN, USAF, MC

THE FOOT AND ANKLE, Their Injuries, Diseases, Deformities and Disabilities, by *Philip Lewin*, M.D., F.A.C.P., F.I.C.S. 612 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1959. Price $14.

This edition notably contains many excellent illustrations, and in general discusses most of the problems involving the feet and ankles encounterd in general and orthopedic practice. There has been a considerable expansion of some sections (e.g., section on disabilities of the great toe now covers about twice as many pages as in the second edition), and an understandable abridgment of others, such as syphilitic and tuberculous involvement of the foot and ankle. There are areas, such as in the important problem of hallux valgus, where 9 or 10 pages are devoted to the splay-foot, sling procedure with numerous illustrations, whereas only 2 short sentences mention the well-recognized and efficacious Keller procedure, and not a single illustration is given of the latter. For the treatment of hammer toe, the classic joint resection fusion treatment is thoroughly discussed, but not even mention is made of another excellent, simple, efficacious method—phalangectomy. Concerning fractures of the os calcis, one is admonished to overcorrect the tuber-joint angle to 35–40 degrees, whereas the significant, disabling "ledge" offset in the subtalar joint, so clearly described and proven by Ivar Palmer, is not even mentioned. Lorenz Böhler himself has been heard by this reviewer to state that he was wrong in declaring restoration of the tuber-joint angle to be the significant therapeutic measure. For a general picture of the subject, this book is better than most.

CAPT. WALTER R. MILLER, MC, USN

CHEMISTRY OF PANCREATIC DISEASE, by *Harris Busch*, M.D., Ph. D. 160 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $5.25.

This monograph provides a relatively brief summary of present understandings concerning the biochemical activity of the pancreas in both health and disease. The discussion of the exocrine secretions of the pancreas includes notes on clinical methods for the testing of tryptic, amylase, and lipase activity. For the determination of pancreatic serum lipase, the author expresses optimism concerning the method of Guth and co-workers (1958), a turbidimetric procedure that utilizes a short (15 minutes') incubation period, applied to complex substrate. The pancreatic diseases dealt with include acute pancreatitis, diseases producing pancreatic insufficiency (cystic fibrosis of the pancreas, chronic pancreatitis, and pancreatic degeneration), diabetes (hypoinsulinism), diseases associated with hyperinsulinism (such as islet cell tumors and functional hypoglycemias), and carcinoma of the pancreas. In the discussion of acute pancreatitis, considerable attention is given to the diagnostic significance of blood amylase, lipase, and trypsin levels and to the phenomenon of hypocalcemia. The chapter on pancreatic insufficiency includes a consideration of the associated loss in dietary fat, fat-soluble vitamins, and proteins, and of means of combating those losses. The following chapter deals with the chemistry and the principles of therapy of diabetes, and includes a résumé of the composition and applications of oral antidiabetic agents. Included in the material on hyperinsulinism is a discussion of the nature and of the causative agent of the entity known as West Indies vomiting sickness. Chapter summaries, plus an extensive bibliography, enhance the range of the individual needs that this volume can be expected to serve.

COL. THADDEUS J. DOMANSKI, USAF, MSC

DISORDERS OF THE TEMPOROMANDIBULAR JOINT, Diagnosis, Management, Relation to Occlusion of Teeth, by *Laszlo Schwartz*, D.D.S., and 18 contributors. 471 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $15.

This is the first edition of a reference book providing a well-edited, thorough, and comprehensive evaluation of the disorders affecting the temporomandibular joints and their associated muscular and ligamentous attachments. Such a complete volume on this subject has not been previously produced. The author has called upon others who are experts in their respective fields to assist in compilation of this excellent text. The broad scope of coverage encompasses details of all facets of these disorders, diagnostic signs and symptoms, various types of management, and the rationales involved. In earlier chapters many of the concepts held by numerous authors are reviewed and analyzed in attempts to determine the true background of disorders affecting this anatomic area. In later chapters treatment, differential diagnosis, treatment planning, and management are reviewed with the same goals in mind. In some of these analyses there seems to be a bias in presentation, though this should not detract from the over-all value of this excellent text. The book is well edited and has a number of detailed illustrations. Actual case histories are used as practical examples to illustrate points of explanation in the text. Each chapter and section are trerminated with a brief but accurate discussion and summary of the material covered. The volume is an excellent reference book in all respects, filling a long-felt need. The detailed and comprehensive coverage of disorders of the temporomandibular joints and their associated musculature, the differential diagnosis associated with these cases, and a mass of correlated information have been gathered together into this one volume in a well-planned and effective manner.

COL. LOWELL E. MC KELVEY, DC, USA

ESSAYS IN INDIVIDUAL PSYCHOLOGY, edited by *Kurt A. Adler* and *Danica Deutsch*, 480 pages. Grove Press, Inc., New York, N.Y., 1959. Price $6.50 cloth, $2.95 paper.

This volume, "in commemoration of 10 years of community service by the Alfred Adler Consultation Center and Mental Hygiene Clinic, New York, 1948–1958," is a hodgepodge of 53 independent articles, written by nearly as many different contributors. Over 30 of the contributors obtained their medical or psychologic training in Europe, predominantly in Vienna, and 20 either studied under or were "co-workers" of Alfred Adler himself. The articles, approximately one half of which are reprinted from previously published materials (for example, 17 articles, are reprinted from the *Journal of Individual Psychology* or *Individual Psychology Bulletin*), are presented under 6 major headings: philosophic concepts, theoretic principles, psychotherapeutic procedures, case histories, conclusions, and appendices. Each article, however, is completely independent of the others, and it is often difficult to decide why a particular article was placed in any one section. Adler's teleologic, purposive, phenomenologic approach and his concepts of social feeling, life style, and compensation for feelings of inferiority are, of course, pervasive themes throughout, and there is a strong flavor of "moralistic positivism" (as opposed to the *logical positivism* associated with current behaviorism). The 3 articles included under "philosophic concepts" develop themes that human progress is "a function of a higher development of social interest"; that social feeling (or social interest) should be conceived of and developed as a "cosmic" and "transcendental" driving force; and that the goal of education "must be to educate an individual to be free of entanglement in the net of ignorance, greed and fear." The 17 articles brought together as "theoretic principles" range from the drawing of parallels between individual psychology and alleged ahistoric, nondeterministic trends in American personality theory, between adlerian psychology and existentialism, and between psychotherapy and religion, to the application of adlerian concepts with respect to compulsions, guilt feelings, schizophrenia, psychoses in general, aging, and mental hygiene and to interpreting "movement" responses of the Rorschach as an expression of social feeling. Add to these themes a denial that Oedipus of Oedipus Rex had an Oedipus complex; development of a new concept, "snobbism," as the "commonest neurosis"; evaluations of creativity and social interaction; and an insistence that psychotherapists must impart their own moral, religious, and social feelings to their patients—and the jumble of theoretic articles is complete. With only few exceptions, including articles by Danica Deutsch and D. I. Malamud, the 14 articles on "psychotherapeutic procedures" seem to be loosely and inadequately developed personal commentaries on a multitude of psychotherapeutic applications, and the 15 "case histories" brief testimonials and documentaries relating to cases handled in the context of individual psychology. One wonders, indeed, whether many articles, especially in these last 2 sections, were not simply inspired by an attempt to give publication recognition to a miscellany of individual psychologists who are associated with the Alfred Adler Consultation Center and Mental Hygiene Clinic or the Alfred Adler Institute of Individual Psychology. Under "conclusions" is a single, independent, reprinted article by Robert W. White. In this article, White attempts to document a basic "competence" drive, and emphasizes the role of Alfred Adler in countering overly mechanistic interpretations of human behavior and in setting the stage for a more "evolutionary," self-respecting ego psychology of the future. Aside from the considerable amount of loosely developed or essentially noncontributory material in this

volume, this publication will probably be most interesting and inspiring to, and best received by, those who think of themselves as having a basically humanistic, teleologic, nonmechanistic, or existential orientation, and least well received by those with freudian or behavioristic orientations.

CAPT. JAMES L. HEDLUND, MSC, USA

PROFESSIONAL NURSING, Trends, Responsibilities and Relationships, by *Eugenia Kennedy Spalding*, R.N., M.A., D.H.L. 6th edition, revised and reset. 694 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.

From the senior student and older graduate desiring a bird's-eye view of the nursing profession today, this extensively revised text deserves consideration. Comprehensive in content, it is informative and easy reading. The occupational and educational opportunities available to the graduate are well described and written with an understanding of the need for guidance in selecting wisely and intelligently early in the professional career. Social, economic, historical, political, legal, and professional trends having an effect on nursing are briefly and ably presented. The importance of professional organizations, what they achieve, and how one can and should participate as a graduate are worth the reading time of the critic who does not believe in or support these organizations. Through the well-digested content of this book, the student is skillfully encouraged to think about her future responsibilities and the possible contributions she can make toward a better profession and society. The suggestions on how to seek and use reference materials found in the appendix and the excellent bibliography and references at the end of each chapter add to the recommendation of this book for all nursing libraries.

LT. COL. EVELYN M. BEDARD, USAF, NC

DENTAL CLINICS OF NORTH AMERICA, Symposium on Office Oral Surgery, November 1959, *Edward C. Hinds*, D.D.S., M.D., consulting editor. 826 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $14 per year for 3 numbers (Mar., July, Nov.)

This is another good symposium in an excellent series. It is designed to help the dentist conduct an office practice of oral surgery. All but one of the contributors are qualified oral surgeons or teachers of this specialty field of dentistry. The one exception is a qualified endodontist with a dental faculty affiliation. The book is recommended for its authoritative context and its general, easy-to-read format. Considerable stress is placed upon the need for adequate preoperative evaluation of ambulatory dental patients as to the extent of anesthetic and surgical risk to be undertaken. It is pointed out repeatedly that many systemically ill patients are not hospitalized, and from this may come problems of medical emergency that develop unexpectedly in a dental office practice. The dentist is cautioned, over and over again, to take patients' histories, make observations, compile laboratory data where need be, and seek expert consultation where unusual risks must be taken. As a matter of fact, these repeated warnings might be the basis for the only criticism of the publication. In this regard, the first 2 chapters remarkably repeat each other in text material. Two publication errors were noted: (1) On page 628, reference number 34 should read 24; (2) on page 646, item 6 was ambiguously repeated in lieu of item 9, which is missing. Various surgical procedures and plans for medication, such as are provided in the office practice of oral surgery, are excellently covered in the light of present knowledge. Of particular interest is a thought-provoking article on odontogenic cysts.

CAPT. THEODORE A. LESNEY, DC, USN

METABOLIC CARE OF THE SURGICAL PATIENT, by *Francis D. Moore*, M.D., and illustrated by *Mildred Codding*, A.B., M.A. 1,011 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $20.

The avowed purpose of this volume as stated by the author in his introduction is "to provide a general text and guidebook for metabolic care in surgery." He has accomplished this so completely and admirably that this book provides in its pages every detail of metabolic management of the surgical patient and its complications preoperatively, during surgery, and in the postoperative period. Divided into 6 parts in order to provide a logical and simple organization of the material presented, the book includes: the normal patient; blood volume; body fluid and electrolytes; loss of body substance; visceral disease in surgical patients; and fractures, wounds, and burns. Each part is preceded by its own detailed table of contents. This deliberate effort to simplify the work of finding specific references is part of the author's attempt to make this volume pre-eminently practical and useful to the surgical practitioner. Another step in this direction is accomplished by incorporating into each part notes and references from the literature and case records from the author's experience. The former permits the interested reader to follow up a subject in much greater detail than possible in the pages of the book. The latter are of particular value as illustrations of the clinical progress of various patients and their complications and therapy. As such they aid in planning a course of treatment for patients with the same or similar difficulties. The sum total is a large guidebook which can be used to follow and to modify the metabolic course of surgical patients throughout their period of illness and convalescence. Exceptionally well organized, illustrated with unusually simple metabolic diagrams, well written in a clear and straightforward style, and containing a wealth of detailed material on metabolic care, this volume is certain to become just as essential a part of the reference library of the surgeon as are the various atlases of anatomy and of surgical technic.

LT. COL. H. HASKELL ZIPERMAN, MC, USA

THE SURGICAL TREATMENT OF SCOLIOSIS, by *Louis A. Goldstein*, M.D., F.A.C.S. Appendix: Anesthesia in Scoliosis, by *D. Vernon Thomas*, M.B., F.F.A.R.C. 116 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $6.75.

This monograph is presented as a summary of 20 years of the author's experience in treating scoliosis at the University of Rochester Medical Center. The text includes a brief review of the literature dealing with this subject and the author's successful adaptation of the principles and methods of therapy established by various authorities. A detailed study is made of 51 patients treated for the idiopathic and paralytic forms of scoliosis by means of turnbuckle casts and spinal fusion. The excellent results obtained attest to the value of a well-planned therapeutic program such as that carried out. In the statistical analysis of the spinal fusions performed on these patients it is demonstrated that fresh autogenous bone is superior to stored autogenous and homogenous bone as a grafting material. The format and illustrations are excellent and there is a brief appendix dealing with the problem of administering anesthesia to the scoliotic patient. There is sufficiently detailed explanation of methods and principles to enlighten the student and to interest the experienced reader; yet the text is not so simplified as to make the reading of it tedious. This book presents a refreshing, practical, and concise handbook on scoliosis, can be highly recommended to the orthopedic surgeon, and should be included in the library of every teaching institution.

CAPT. HERBERT A. MARKOWITZ, MC, USN

MITRAL VALVULOTOMY, by *Harold J. Stewart*, M.D., and *Frank Glenn*, M.D. 244 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $10.50.

This excellent monograph on the operation of mitral valvulotomy is divided into 3 parts. The first discusses the experience of the authors and their hospital services with their first 100 patients undergoing mitral valvulotomy. Part 2 discusses the second and third 100 patients. The third part presents the long-term follow-up on the first 100 patients. Basic selection and management of patients for the operation are presented; the operation is described, and post-operative care is discussed. Thereafter a complete and detailed statistical analysis of all aspects of the problems connected in any way with the results of the procedure is presented. The book is highly recommended as a reference for internists and surgeons alike who are in any way connected with selection and management of patients with mitral stenosis and related disease in which the operation of mitral valvulotomy is indicated.

CAPT. FELIX P. BALLENGER, MC, USN

A FUNCTIONAL APPROACH TO TRAINING IN CLINICAL PSYCHOLOGY, by *Abraham S, Luchins*, Ph.D. 288 pages. Charles C Thomas, Publisher, Springfield, Ill. 1959. Price $7.50.

This manual describes a training program for psychologists organized around the study of a mental hospital. Some of the assumptions and characteristics of this program suggest a role for the psychologist as a student of behavior and social processes different from his traditional one of technician or diagnostician. Clinical psychology as a profession makes a contribution apart from that of psychiatry. The approach of this book aims to develop a clinician who is not only well versed in behavioral phenomena, but who can function in clinical installations as a practitioner and scientist with very little schism between service and research. The training program is developed along intradisciplinary and interdisciplinary lines in order to emphasize its multitheoretic, variational outlook, with a focus on clinical phenomena and phenomenologic orientation. The goal is to offer the psychologist a multitude of resources for drawing concepts, tools, and approaches with which to deal with clinical phenomena. The author has a pedagogic fondness for the socratic method, which utilizes the problem-centered approach via a multitude of questions. The manual contains endless questions in the sequence of activities that make up the bulk of the units and projects described in the book. "The manual seeks to provide a structure and to substitute active, directed observations (by asking questions) for passive observation . . . the rule of procedure is for different people in the institution to participate in studying themselves and the hospital, with the resources of the training program serving as catalysts and communication centers." In essence the training program is an analysis ("self analysis") of the hospital through a survey of its services and facilities, with a study of its personnel and patients, an inquiry into work details, diagnostics, therapy and community relationships, and an audit of a functional unit and action research. The manual serves as a model for the social and psychologic analysis of institutions by the other professional groups in the behavioral sciences. Its program can be adapted to other kinds of installations. This manual will be welcomed by the members of the mental health team as an excellent counterpart to Stanton and Schwartz's *The Mental Hospital* because of the many questions it raises, to which the latter book offers a few answers.

LT. COL. FRANK KILLIAN, JR., USAF, MSC

MEDICAL MANAGEMENT OF THE MENOPAUSE, by *Minnie B. Goldberg*, M.D. 98 pages; illustrated. Grune & Stratton, Inc., New York, N.Y., 1959. Price $4.50.

This very readable and informative little handbook should be in every gynecologist's library. It is a practical, condensed treatise that will be of great value in the management of this sometimes difficult and complex problem that confronts all physicians dealing with a trying period of most women's lives. Further, it will be useful for the gynecology resident during his training days. The author gives a condensed description of menstruation, as a background for the later chapters on the physiology of menstruation and the cause of the menopausal syndrome. This is followed by a discussion of the physiology of gonadal steroids. The next subject treated is symptomatology of the menopause with its many manifestations. Some time is devoted to diagnosis and diagnostic procedures, followed by a discussion of the therapeutic armamentarium. A chapter is devoted to hormones used, their effects and undesirable side effects, and signs of overdose. A very enlightening discussion naturally follows on choice of therapy and management and on therapeutic problems. This is a condensed commonsense approach to the management of a difficult syndrome of symptoms—a book well worth owning and reading.

CAPT. ROY W. TANDY, SR., MC, USN

THE ARTERIAL WALL, edited by *Albert I. Lansing*, A.B., Ph. D. Sponsored by The Gerontological Society, Inc. 259 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $7.50.

Written by 13 outstanding authors, this is a well-printed volume on nonglossy paper and comprises 10 chapters with occasional illustrations. The first chapter discusses methods of demonstrating arterial vasa vasorum, as well as their distribution in humans, dogs, and rabbits. It is noted that these nutrient vessels do not develop in the intima and inner third of the media except as a result of arteriosclerosis. Chapter 2 covers structure and behavior of vascular endothelium, including changes with inflammation, aging, and infection or injury. The third chapter describes the proteins of skeletal and smooth muscle tissue in general, as well as muscle physiology. Since connective tissue is an integral part of the arterial wall, collagen and ground substance are elaborated upon in chapters 4 and 5. The mucopolysaccharides of arterial tissue are discussed at length in the sixth chapter, including histologic, metabolic, and chemical studies. It is of interest that these substances appear to possess a definite anticoagulant activity in humans. Chapter 7 deals with enzyme studies in arterial tissue, the physiology of oxygen uptake, the Krebs cycle, glycolysis, and phosphates containing high-energy bonds. Factors altering enzyme activity, such as arteriosclerosis, aging, vasoactive drugs, and stress, are covered. The relationships of lipid metabolism of connective tissue to vascular aging are discussed in chapter 8. Finally arterial metabolism is elaborated upon in the ninth chapter, including a separate evaluation for each tunic. Respiration, glycolysis, protein synthesis, and calcification of the arterial wall are described from a metabolic standpoint. A summary is included in chapter 10. This very interesting and informative book is of considerable value to students of cardiovascular disease and to research scientists in this field. Numerous problems and unknown factors are posed which should give rise to additional research. The book is stimulating reading for anyone in the field of medicine or physiology.

COL. BYRON A. NICHOL, MC, USA

PEDIATRIC CLINICS OF NORTH AMERICA. Symposium on Pediatric Allergy, August 1959. Vol. 6, No. 3. *Lewis Webb Hill*, M.D., and *Harry L. Mueller*, M.D., consulting editors. 942 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $15 per year (4 books issued quarterly).

In the foreword to this symposium, Doctors Lewis Hill and Henry Mueller state that "the world swarms with allergic children." It is because we, as physicians, encounter these children daily that we must be adequately prepared to cope with them. This small but comprehensive volume provides an excellent approach to these problems. It is a compilation of 20 articles dealing with the entire spectrum of pediatric allergy. Each subject is dealt with thoroughly from a clinical and therapeutic viewpoint. Twenty authorities discuss their fields of special interest and divulge their secret potions and outlines of therapy. In a field which is highly scientific and precise and yet, at the same time, nebulous and even mystic, it is refreshing to be exposed to so many medical opinions. In some instances there is a difference of opinion, as in other fields of medicine. For example, in one article (p. 657) emphasis is placed on the psychosomatic aspects of allergic disorders, whereas in another (p. 835) the author casts some doubt on this concept. On page 688 we are told that aminophylline is a "useful drug" in asthma in infancy while on page 721 it is "not recommended for treatment of bronchial allergic disease in children." I believe this divergence of opinion is a valuable aspect of the book. In general, however, a consistent and straightforward approach to allergic disease is offered. The clinician is guided in the management of asthma, eczema, hay fever, urticaria, rhus dermatitis, cow's milk allergy, and insect allergy and instructed in the evaluation and worth of skin testing, hyposensitization, use of steroids, institutional treatment, environmental allergens, and prophylaxis of allergic disease. I enjoyed this book and recommend it to all pediatricians and general practitioners.

COL. OGDEN C. BRUTON, MC, USA

RADIATION THERAPY, by *Walter T. Murphy*, M.D. 1,140 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $25.

This comprehensive text is a first edition compiled by an outstanding practicing radiotherapist. The material presented is based on the author's 25 years of experience as a radiotherapist in the Roosevelt Park Memorial Institute and an exhaustive study of the literature. The extensive bibliography that follows each chapter permits the interested investigator to pursue almost any facet of radiotherapeutics to the extent desired. The first chapter, 70 pages in length, is devoted to a more than cursory review of some of the practical aspects of the physical and biologic factors affecting radiation therapy. The remaining chapters of this volume are given over to discussions of the evaluation and management of neoplastic disease in various anatomic locations and systems. Technics, classifications, end results, and complications with their management are discussed in detail. Numerous tables, charts, line drawings, and excellent photographs of actual lesions and roentgenograms emphasize and clarify important features discussed in the text. This volume would make a worthwhile addition to the library of any practicing radiologist and is particularly recommended for residents in radiotherapy. It is specifically recommended for inclusion in the libraries of military hospitals having a requirement for a current guide and reference volume covering the field of radiotherapeutics.

COL. GEORGE C. BESS, USAF, MC

THE SURGICAL TREATMENT OF FACIAL INJURIES, by *Varaztad Hovhannes Kazanjian*, C.M.G., D.M.D., M.D., F.A.C.S., D.Sc. (Hon.), and *John Marquis Converse*, M.D., F.A.C.S. 2d edition. 1,110 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $22.

This second edition covers the surgical treatment of facial injuries very completely and contains many new chapters and expansions of previous chapters that are a great improvement over the first edition of 10 years ago. The book is a presentation of the authors' methods of successful handling of these injuries, in which they frankly state that they "have limited the techniques described to those with which [they] have had actual personal experience." Thus, while presenting their own method of treatment, they do not wish to minimize other successful methods that are not mentioned in the book. With these limitations understood, the book is an excellent presentation of its subject. Many basic general principles of plastic surgery are also covered, making it valuable as a textbook to the beginning plastic surgeon. The chapter on roentgen examination of the facial bones is of value to any doctor who deals with acute injuries of the face. The new sections in this edition should be of value to all doctors handling acute trauma and will aid in more accurate diagnosis and correct initial treatment prior to more expert definitive treatment. The book is well written, well indexed, and well illustrated. The authors have a vast personal experience in the subject and present their viewpoints in a well-organized and pleasant manner that makes for easy enjoyable reading. The extensive bibliography at the end of the book makes additional reading readily accessible. I believe that this book would be an adjunct to any surgeon and especially to those who deal with acute facial trauma.

COL. HAL B. JENNINGS, JR., MC, USA

THE ACUTE MEDICAL SYNDROMES AND EMERGENCIES, Diagnosis and Treatment, by *Albert Salisbury Hyman*, M.D., with the collaboration of *Samuel Weiss*, M.D., *George Guttman Ornstein*, M.D., *Howard F. Root*, M.D., *Anna Ruth Spiegelman*, M.D., and *Jack Abry*, M.R. 442 pages; illustrated. Landsberger Medical Books, Inc., New York, N.Y., 1959. Price $8.75.

This small book is divided into 6 parts, each by a different author. The first 214 pages as part I deal with the cardiovascular emergencies. The following 130 pages as part II and part III are devoted to gastrointestinal emergencies and pulmonary emergencies respectively. The apparent purpose of the authors in writing this book was to integrate newly acquired knowledge of the past decade with previous experience in the diagnosis and treatment of various acute medical conditions in the field of internal medicine. The subjects in the first 3 parts are considered to be inadequately presented. The discussion is usually verbose, deals in broad generalities, and offers insufficient and indefinite recommendations for management. Only one of several examples will be cited: It is stated that the emergency treatment of acute hypertensive encephalopathy may be phlebotomy, lumbar puncture, or spinal anesthesia; no mention is made of the veratrum or rauwolfia drugs or the ganglionic blocking agents. Part IV on diabetic emergences by Dr. Howard Root is covered in an excellent manner. It is clear, concise, and practical. The last 2 parts discussing the acute renal syndromes and barbiturate intoxication are well written. It is believed that the major subjects covered in this book are better explained in a more concise, authoritative, and practical manner in standard textbooks of medicine. This book cannot be recommended for use by physicians.

COL. DOSS O. LYNN, MC, USA

ELIASON'S SURGICAL NURSING, by *L. Kraeer Ferguson*, A.B., M.D., F.A.C.S., and *Lillian A. Sholtis*, R.N., B.S., M.S. 11th edition. 766 pages; illustrated J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.

This revision of a well-known textbook on surgical nursing is a fine contribution to nursing literature. As noted in the preface, the book is aimed at the student nurse particularly. Although the stated purposes in presenting this revision seem extremely broad and comprehensive for any one volume to encompass fully, the authors have presented large amounts of material briefly and succinctly in a fashion that should serve as valuable stimulus for further study by the experienced as well as the young nurse. The short lists of references for additional reading following each chapter are particularly impressive because each one is recent, pertinent to the topic discussed, and should be readily available in any hospital library. The format is consistent and the book easy to read and to follow. General content of each chapter is outlined in the table of contents and is reviewed again at the heading of the chapters. The content proceeds from the general to the particular in most instances. One criticism that might be made concerns the occasional clinical situations with multiple choice questions included at the end of some chapters. These selected situations are so sketchy and tend to highlight fragments of content in such a way that other valuable material might be minimized or overlooked by some readers. The many diagrams and pictures seem to have been chosen with thought and are aptly placed. In some instances, however, the visual aid material could have been more complete—such as the diagrams of the tracheotomy tube—or more modern—such as the equipment for chest and stomach suction. Part 3 on emergency or disaster nursing is commendable, but seems very limited in scope.

In addition to its use by student nurses, this book would be a most helpful addition to any surgical ward library as a quick reference for all nursing personnel caring for surgical patients.

MAJ. RUTH L. GREENFIELD, NC, USA

ESSENTIALS OF MEDICINE, The Art and the Science of Medical Nursing, by *Charles Phillip Emerson, Jr.*, A.B., M.D., and *Jane Sherburn Bragdon*, R.N., B.S., M.Ed. 18th edition. 857 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.75.

This edition varies in organization from the previous one in that it is divided into 3 parts: fundamentals of nursing care, nursing care of patients with specific medical problems, and nursing in disaster. A valuable feature of the new edition is the unit discussing the nurse's role in diagnostic tests, including a table listing 72 laboratory tests. A section is included in this edition on modern psychopharmacology and principles of effective nurse-patient interaction. The chapter on disaster nursing dealing with modified procedures in emergency situations should be of value to all nurses. There are 8 chapters devoted to the nursing care of patients with communicable diseases. Eighteen chapters discuss in detail the nursing care of patients with specific medical problems according to the body systems. The selected references at the end of each section are inclusive and helpful for research and further study. This medical nursing textbook would be of value in every medical library as a reference for military and civilian nurses working on medical, psychiatric, or communicable disease wards. This book would be especially valuable in teaching medical technicians. A correlated summary of nursing problems arranged in concise outline form included for each disease would assist the instructor in stressing important factors in nursing care.

MAJ. ADELINE T. BELL, USAF, NC

New Books

Books received by the U.S. ARMED FORCES MEDICAL JOURNAL *are listed in this department for the information of readers, and as acknowledgment and appreciation of their receipt from the publishers. Those of greatest interest will be selected for review in a subsequent number of the* JOURNAL.

SURGICAL PHILOSOPHY IN MASS CASUALTY MANAGEMENT, with Detailed Notes on Practical Care, by *Warner F. Bowers*, A.B., B. Sc., M.D., M.S., Ph. D., and *Carl W. Hughes*, A.B., M.D. 204 pages. Charles C Thomas, Publisher, Springfield, Ill., 1960. Price $6.75.

HYPNOANALYSIS, by *Lewis R. Wolberg*, M.D., with a foreword by *A. Kardiner*, M.D. 342 pages. Grove Press, Inc., New York, N.Y., 1960. Price $2.25.

FORENSIC MEDICINE, Observation and Interpretation, by *A. Kieth Mant*, M.D. (Lond.). 262 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1960. Price $8.50.

CLINICAL APPLICATIONS OF DIAGNOSTIC AND THERAPEUTIC NERVE BLOCKS, by *John J. Bonica*, M.D. Publication Number 342, American Lecture Series. 354 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $8.75.

BACTERIOLOGY FOR STUDENTS OF DENTAL SURGERY, by *R. B. Lucas*, M.D., M.R.C.P., D.P.H., and *Ivor R. H. Kramer*, M.D.S., L.D.S.R.C.S. 2d edition. 288 pages; illustrated. Little, Brown & Co., Boston, Mass., 1959. Price $6.

THE TRIUMPH OF SURGERY, by *Jürgen Thorwald*. Translated by *Richard* and *Clara Winston*. 454 pages; illustrated. Pantheon Books, Inc., New York N.Y., 1960. Price $6.50.

PYELONEPHRITIS, by *Fletcher H. Colby*, M.D. 214 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $7.50.

THE PHYSIOLOGICAL BASIS OF DIURETIC THERAPY, by *Robert F. Pitts*, Ph.D., M.D. Publication Number 366, American Lecture Series. A Monograph in The Bannerstone Division of American Lectures in Physiology. 332 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $9.75.

ACUTE PERICARDITIS, by *David H. Spodick*, M.D. 182 pages; illustrated. Grune & Stratton, Inc., New York, N.Y., 1959. Price $6.50.

BEHAVIORAL CHANGE IN THE CLINIC—A Systematic Approach, by *Gerald R. Pascal*, Ph.D. 128 pages. Grune & Stratton, Inc., New York, N.Y., 1959. Price $4.75.

THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS INSTRUCTIONAL COURSE LECTURES, Vol. XVI, 1959, edited by *Fred C. Reynolds*, M.D. 335 pages; illustrated. C. V. Mosby Co., St. Louis, Mo., 1959. Price $16.

GROWTH DIAGNOSIS, Selected Methods for Interpreting and Predicting Physical Development from One Year to Maturity, by *Leona M. Bayer* and *Nancy Bayley*. 240 pages; illustrated. The University of Chicago Press, Chicago, Ill., 1959. Price $10.

ANALYTICAL CYTOLOGY, Methods for Studying Cellular Form and Function, edited by *Robert C. Mellors*, M.D., Ph. D. 2d edition. 534 pages; illustrated. McGraw-Hill Book Co., Inc., New York, N.Y., 1959. Price $17.50.

COMMAND DECISIONS, prepared by the Office of the Chief of Military History, Department of the Army. *Kent Roberts Greenfield*, general editor, with 16 contributors. Introduction by *Hanson W. Baldwin*. 481 pages; illustrated. Harcourt, Brace & Co., New York, N.Y., 1959. Price $5.95.

BIOCHEMISTRY OF BLOOD IN HEALTH AND DISEASE, by *L. Newman Kugelmass*, M.D., Ph. D., Sc. D. 643 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $15.75.

PATTERNS OF PSYCHOSEXUAL INFANTILISM, Disorders of the Instincts and the Emotions. The Parapathiac Disorders, by *William Stekel*, M.D. Edited and with an introduction by *Emil A. Gutheil*, M.D. 412 pages. Grove Press, Inc., New York, N.Y., 1959. Price $1.95.

THE NATURE OF STRESS DISORDERS, Conference of The Society for Psychomatic Research Held at the Royal College of Physicians, May 1958. 298 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $5.50.

RECENT PROGRESS IN MICROBIOLOGY, Symposia held at the VII International Congress for Microbiology, Stockholm, 1958. *G. Tunevall*, editor. 453 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $14.

DIABETIC MANUAL, by *Elliott P. Joslin*, M.D., Sc. D. 10th edition. 304 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1959. Price $3.75.

PATHOLOGY OF TUMOURS OF THE NERVOUS SYSTEM, by *Dorothy S. Russell*, Sc. D., M.A., M.D., F.R.C.P., LL.D., and *L. J. Rubenstein*, M.D., with a chapter on Tissue Culture in Relation to Tumours of the Nervous System, by *C. E. Lumsden*, M.D. 318 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $13.50.

METABOLIC ASPECTS OF RENAL FUNCTION, by *William D. Lotspeich*, M.D. 214 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.50.

RADIOLOGIC EXAMINATION OF THE SMALL INTESTINE, by *Ross Golden*, M.D. 2d edition. 560 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $28.50.

ELECTRICAL IMPEDANCE PLETHYSMOGRAPHY, The Electrical Resistive Measure of the Blood Pulse Volume, Peripheral and Central Blood Flow, by *Jan Nyboer*, D.Sc., M.D., with a foreword by *Franklin D. Johnston*, B.S. (Eng'g), M.D. 243 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.50.

RHEUMATIC FEVER, Epidemiology and Prevention. The Proceedings of a Seminar Held at the International Children's Centre, Paris, 25–27 September 1956, edited by *R. Cruickshank*, M.D., Ch.B., F.R.C.P., D.P.H., and *A. A. Glynn*, M.B., B.S., M.R.C.P. 193 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $5.50.

ALCOHOLISM, An Interdisciplinary Approach, edited by *David J. Pittman*, Ph.D., with a foreword by *John C. Glidewell*, Ph.D. Proceedings of the First Annual Conference on Community Mental Health, Social Science Institute, Washington University, 1959. 96 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $3.75.

LYMPHOCYTES AND MAST CELLS, by *Margaret A. Kelsall*, B.A., M.A., Ph.D., and *Edward D. Crabb*, B.A., M.A., Ph.D. 399 pages. Williams & Wilkins Co., Baltimore, Md., 1959. Price $8.

THE YEAR BOOK OF GENERAL SURGERY (1959–1960 Year Book Series), edited by *Michael E. DeBakey*, B.S., M.D., M.S., with a section on Anesthesia, edited by *Stuart C. Cullen*, M.D. 639 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1959. Price $8.

U.S. GOVERNMENT PRINTING OFFICE 1960 O—544551